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WHITE PAPER

Key Business Issues in the Service Layer

The evolving marketplace for user services and impacts on operator service networks

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1 Introduction

What people want to do with communications keeps changing, creating new opportunities and placing new demands on network operators. Advances in terminal and available bandwidth are creating opportunities for new services and network capabilities. With the introduction of services beyond voice access to multiple networks and enterprise data have become a part of the average user's expectations.

As operators are expanding their offerings to include content and application (C&A) providers outside the traditional operator domain, they need service and content-delivery infrastructures that not only meet current and future user requirements, but that will also support evolving business models and greatly expanded value chains. Service interfaces must support the needs of "non-telecoms" IT-oriented developers and service providers, while providing carrier-grade quality to users. Operators also want to ensure low costs for new deployments while getting the maximum value out of currently installed infrastructure.

The sum of the business and network infrastructure elements that are needed to address this market is called the Service Layer, and any specific implementation of such an environment is called a service network.

This white paper looks at how the service marketplace is evolving, and at how these changes impact networks operators, their operation, partnering strategies, and establishes some key issue in vendor selection.

1.1 What is the Service Layer?

The basic need for communication between people is the dominant driver for the telecoms business. But it is also clear that the role that telecommunications play in the lives of users is expanding beyond voice to new services that allow people to do more than just speak to each other: to use sound, text, image and video in their interactions. Users also want to get access to services such as news, sport, games and music from any place and at any time. The business environment for these services places demands on supply-chain management including partner management, revenue sharing, customer management, service management and marketing to increasingly specialized segments. The network environment, i.e. the operator's chosen architecture and how it is implemented, is also a commercial success factor, placing increased demands on service assurance, delivery and enablers, user databases, charging systems and so on. Of course these are dependent on evolving capabilities within devices such as handsets and PDAs, and the ability to make use of new services easier, such as activation in-store and over-the-air and self-provisioning.

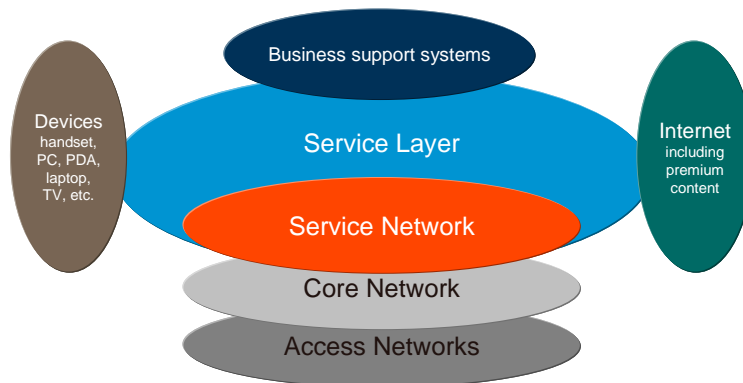
The term Service Layer specifies the marketplace within which these objectives can be met.

1.1.1 The Service Layer Marketplace

The Service Layer is used to capture an end-to-end (e2e) perspective on the service environment and the services provided through a telecommunications network. This includes everything that is needed in:

- the user equipment
- the operator network
- connected networks and equipment
- content and applications
- business processes

to ensure that services can be presented to an end-user in a convenient, attractive and understandable manner.



Within an operator network, the Service Layer provides:

- End-User services beyond traditional voice
- Services for Enterprises and Content & Application providers
- Support for the Operators' business processes
- Access to functions in the core and access networks

This is where the telecom world meets the IT world, and where the actors and technologies from these two worlds struggle for supremacy. As new services beyond voice are introduced, the media world and content industries also enter the scene, with all parties evaluating how to optimize their options.

The Service Layer marketplace is highly competitive where many products have short life cycles. It's simply not possible for any single vendor to develop a complete product portfolio of his own. In order to have more "complete" offerings and to increase business opportunities with customers, strong and competitive Partner Programs are crucial.

As this market evolves, business in the Service Layer is increasingly executed in terms of providing solutions to specific operator and user issues, ensuring e2e functionality from both a business perspective i.e. *"from contract to user"* as well as from a technical communications and traffic perspective i.e. *"from application to terminal"*). A key success factor will be the ability to define, create and deploy unique customer solutions into the customers existing technical environments and business processes.

Because it has such a high impact on their revenues, most operators today are looking to the Service Layer as key in their overall business strategies.

2 Evolution of the Service Layer marketplace

Many markets have reached a saturation level where growth is achieved by increasing the usage of new services. In these markets there is an increased need for operators to differentiate, because of tougher competition, and to exploit alternative revenue sources.

The convergence of wireline, wireless and media is happening now, bringing together the telecom world, the Internet and the IT world. The actors and technologies from these worlds are striving to define their evolving roles. At the same time as new service providers and service aggregators are entering the market, the media world and content industries also looking to the Service Layer as a new distribution channel, with all parties evaluating how they fit in this expanded value chain. So the Service Layer marketplace is becoming increasingly competitive, and service life cycles have shrunk dramatically. In order to reduce the complexity and cost of integrating all these players into a unified market, standards bodies and industry alliances have responded with specifications that lower development risk, facilitate life-cycle management and offer venues for interoperability testing across the value chain.

The user perspective has also evolved significantly: with the advent of the Internet, people have become accustomed to having easy access to information, and to having a common connection point for others to communicate with them. This has allowed them to establish an image that projects how they would like to be perceived by the world around them.

2.1 Give users services they want

The importance of knowing the users and segmenting them based on their needs, values and behavior is paramount in this fast evolving market.

For some segments, the combination of wireless voice and data services is changing people's interaction with the outside world, and has become a defining element in people's lifestyle and identity. Since, people want to do more with their handsets, such as browse the Internet, get access to corporate information, and access news, sports, music, games, video and more, the handset is getting more and more "personal", with possibilities to customize the handset its behavior and that of the services it accesses, all according to the user's own preferences. In response to demand, new business is now also moving into the telecoms channel from other industries.

Communications services can be divided into three categories. Person-to-person (P2P) services include communication services between individuals using voice, text or picture messaging, video telephony, push to talk and so on. Person-to-content (P2C) services provide access to content and media such as browsing, downloading or streaming news, sports, music, games, pictures and more. Enterprise access services give users access to enterprise data and productivity applications such as e-mail, calendar and Internet access, and access to other server-based applications and so on.

The forecasts for growth in these areas vary significantly, showing that nobody really knows how this market is going to develop. However, the way people use wireless telephony in public is changing what is considered socially acceptable. Such changes rarely happen without some degree of friction. It is interesting to note that in 2004, for the first time, Americans rated the wireless handset as No.1 in a ranking of the most annoying technologies that they cannot live without. This is clear evidence that the use of communications among average users is changing and that social mores are indeed being affected.

2.2 Make services easy to use

Experience has shown that new services will succeed only if they make things easier, faster, less expensive or more convenient for the user than existing services. Of these factors, ease of use is the key to market acceptance, because it sets the level of effort the user must invest in order to get the benefits of adopting the service.

Ease of use is commonly defined not only as the ease of using the service itself, but also of modifying and personalizing the service, combining it with other services and content, and sharing the result with friends. There are also factors in ease of use related to the user's actions before and after actual use of the service. These include finding, subscribing to and configuring a new

service, paying for it, and perhaps terminating the service without major effort or complex procedures. All these factors define how that service provider helps the user and they have a major impact on the operator's brand image.

Ease of use promotes more usage, and therefore has an impact on market size. Yet ease of use is also a relative term – what is easy for some is unusable for others. For example, most teenagers are on fixed budgets and so will go to any length to increase the number of social interactions they can have for the least money spent. This has been a leading factor in the widespread adoption of SMS despite the relative complexity of its text entry. However, for another category of users, those who cannot or will not use computers and so do not have access to e-mail, SMS has become the prime vehicle for messaging because its addressing system is even simpler than e-mail or the web – just the same old phone number that subscribers have been using all along.

In summary, ease of use is the main gating factor to operator success in the Service Layer, with short-term impacts on service uptake and channel substitution, and long-term impact on operator brand image.

2.3 Make it work

It would be a mistake to think that users accessing a service using their handsets have the same expectations as users accessing a service using the Internet, even when the mobile services are the same as those offered on the Internet. In fact, user expectations in telecoms are quite different from those of Internet users.

First, when using telecom services users have much lower tolerance for delays than when using Internet. This is not just because a wireless user might be standing in a noisy crowd instead of comfortably seated at home, but also because of the way telecoms services are charged - often by second. Because telecoms users are often in transit, they are more sensitive to any wasted time. Telecoms users will simply not wait more than three seconds for a response. They also require more tolerance from the services themselves: wireless handset users get around, but they still expect their services to behave properly if they are cut off for a few seconds, such as when stepping into elevators.

Consider also that telecoms users have more intimate relationships with their phone services, and expect them to work like the phone itself: instantly accessible, with all other telephone users across different operators and networks, and anywhere in the world. This last requirement places very different demands on a service than what is likely to be required in an Internet scenario, and so services that succeed on the Internet will not necessarily succeed in a telecoms setting.

Finally, reliability and quality of service are the key differentiators of the value proposition of operators, a key to operators replacing other channels and extending their value chains, and thus to achieving long term success.

2.4 Make it easy to pay

Users demand spending control and a secure, low-risk environment in which to try new services. This favors simple pricing schemes based on the value of the content or service delivered. Users are not likely to consume more services if at the end of the month they get a big bill that they do not understand and might not be able to afford.

Being easy to pay also means that there should not be any barriers to payment: no special contracts to sign to get access to content services; no complex procedures to make and confirm purchases. Users prefer to pay for new data and content services using their existing pre-paid or post-paid accounts with the operator and to let the operator manage the business relationships with the actual suppliers. This is just the conventional retail business model that everyone is familiar with from grocery and department stores, but applied in the context of the virtual world. Operators can become the retail channel of preference for new and existing services and content by making it easy for users to pay.

Another factor affecting the types of services that users may prefer to access from operators is the trust relationship these users have with their operators. This is quite different from the almost anonymous relationships on the Internet, and creates new opportunities for operators to act as trusted intermediaries for users by becoming the retail access point for services and media, and taking care of sourcing, delivery and payment.

The importance of ease of payment is often overlooked, but it has a major impact on the user making repeat purchases and thus on the service provider's long-term sales prospects. When it comes to their pocketbooks, most people are very conservative and will favor suppliers who maximize their level of confidence and minimize their feeling of risk and exposure to overcharging or incorrect billing.

2.5 Summary of user needs

This retail business model, although new to the telecoms industry, has existed for hundreds of years. The retail store provides these key attributes to the purchaser: faster and more convenient access to services and content with one-stop-shopping to fulfill many needs, reduced purchasing risk by providing a dependable satisfaction guarantee, and easier payment as there is no need to set up credit accounts with several suppliers. With all these attributes, the department store makes shopping a more transparent process: shoppers can

focus on their needs and on the products, not on where to find them, and whether they can trust the vendor.

Telecoms users have additional expectations over traditional retail or even Internet buyers. They want telecoms services that are:

- Simple – straightforward to find, subscribe to and set up. Terminals should be automatically reconfigured on purchase of the service.
- Intuitive – the service should work the way the subscriber does. It should be possible to personalize the service, and unnecessary for the user to read a manual before the service can be used.
- Immediate – the service should be available immediately upon purchase, and response times should be lower than three seconds at the most.
- Everywhere – subscribers should be able to access the service no matter where they go, even outside their home country.
- Always there – subscribers expect services to be reliable and accessible at all times. Some would pay more for added quality.

Operators who succeed in offering communications, content and services to subscribers in a transparent, easy-to-use fashion will have a significant competitive advantage, and will in turn offer true added value for service and content partners. Their offering will therefore likely to attract more subscribers and partners, increase in variety and quality, and build a richer value chain and operator brand.

3 Impact on operators

Within an operator network, the Service Layer includes:

- End-user services beyond traditional voice
- Services for enterprises and content & application providers
- Support for operators' business processes
- Access to functions in the core and access networks

Business in the Service Layer will more and more be in terms of providing solutions to specific user and operator issues, ensuring end-to-end functionality from both a business perspective from contract to user as well as from a technical communications or traffic perspective from application to terminal.

Service Layer architecture must cater to each operator's unique needs, goals and starting position. In this sense it is an expression of the operator's business strategy and goals, and a key operator business asset: the ability to define, create and deploy new services into existing technical environments and business processes will be a major tool in defining the operator's competitive position in the market.

Even though the cost of implementing a service network represents only a fraction of the infrastructure costs of the total network, the Service Layer has the potential of significantly increasing average revenue per user (ARPU) and expanding the user base into new markets. To operators, this means bigger returns on overall network investments, not only by providing revenue from the actual services delivered, but also by contributing to the bottom line in the following ways:

- Expanding the operator's value chain into new business segments and markets, e.g. paying for parking via the wireless handset
- Make possible new operator branding and go-to-market strategies via inexpensive service development, leveraging of third-party applications and the use of external application-service providers
- Exploiting new trends by reducing time-to-market for new services
- Focusing on niche markets with higher margins
- Reducing churn by service differentiation and by offering end-users services that can be personalized
- Increasing airtime by triggering the impulse to respond to voice, text and multimedia messages, and
- Getting more revenue from legacy services by integrating them into new services with enhanced features.

3.1 Services and applications

The telecoms market today is vertically integrated, with applications and services closely tied to the access network, be it wireless or wireline. However, the traditional vertical business and technology segmentation is beginning to tilt. The value chain is segmented horizontally and virtually any application or service can be provided over any underlying network - the anywhere, anytime, any network on any terminal principle.

Operators therefore need to make it possible for applications to share all the functionality within their services environment efficiently: a horizontal solution that can cope in terms of time-to-market, flexibility, scalability and user-friendliness.

3.1.1 Expanding value chains and the associated expanded business processes:

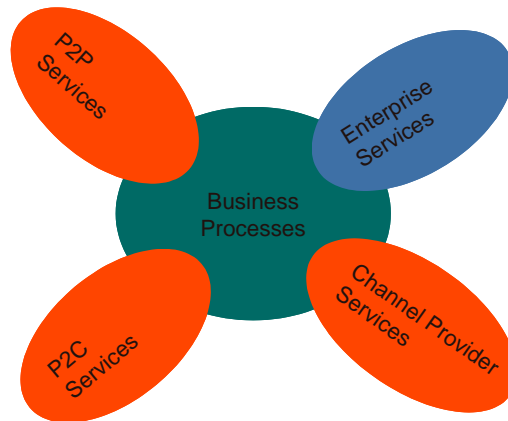
From the business perspective, the Service Layer is a value-creation environment in which operators can differentiate their offerings, extend their value chains and implement new business models. To achieve this, operators require more sophisticated business-to-business interfaces, improved interoperability assurance and internationally available open standards that are network independent, such as Parlay/OSA, OMA and IMS.

In this light, there are two fundamental parts to an operator's business environment. The first is the service offering, reflecting end-user revenue opportunities such as P2P, P2C and enterprise services, as well as channel-provider services to third-party service and content providers. The second is the operator's business process, reflecting opportunities for cost efficiency in implementing an efficient Service Layer infrastructure.

Each operator will package the elements of these two parts according to its own specific marketing and sales strategy.

The four service segments, which form the outer periphery in the diagram above, represent substantially different business situations for the operator, imposing different demands on its business processes and infrastructure. The business process needs to be cost effective and flexible to resolve the following challenges:

- How to introduce new services quickly;
- How to manage customers and subscriptions;
- How manage the service portfolio;
- How to manage revenues and payments;
- How to manage partners and suppliers.



3.1.2 Service segments and business models

P2P communication services are the traditional business for operators and the telecom industry. This service segment has originally been based on circuit switched voice, but has lately been complemented with other mechanisms such as messaging via SMS and MMS. IP Multimedia Subsystem (IMS) significantly expands the P2P context by targeting voice-over-IP and multimedia sessions based on audio, video and streaming. This segment

works basically according to well-known traffic and business models, and will continue to be a volume market and core business for the foreseeable future. Prerequisites for success include interoperability and roaming between operators. Competition and differentiation are primarily driven by tariffs and bundling through branding and loyalty programs once coverage and mass-penetration of new technologies have been accomplished.

P2C communication services as well as its converse, content-to-person (CTP), represent a new business scenario for the industry, made possible by the introduction of new capabilities in the networks and terminals to access, distribute and interact with visual and audible information. This scenario has introduced new actors on the stage: the content and application (C&A) providers, and also a range of new business models between the operators and these new players. These models can basically be broken down into the following two cases:

- Service provider – when the operator buys and resells content and/or applications from the C&A providers to his customers. This has sometimes been referred to as a “walled garden” and/or “virtual home environment” (VHE) scenario, where the operator takes full responsibility for the service and the content towards its end-users. Differentiation is based on branded services.
- Channel provider – when the C&A providers sell their content and/or applications directly to the operator’s customers as service providers. This has sometimes been referred to as an “open service” scenario. The operator can either act as a “transparent bit-pipe,” or as a channel provider. In the first case, there is no business relationship between these players, and the operator is essentially ignorant of what is communicated. In the second case, the operator provides a distribution mechanism and other assets for the C&A providers as customers, and has no ownership, responsibility or liability for the content itself as far as the end-users are concerned. This responsibility remains with the C&A providers.

Differentiation is based on:

- Different digital media mechanisms such as SMS, MMS and streaming
- User and service information of which the network is aware such as location etc.
- Functions to support business processes such as marketing, charging, authentication and delivery assurance
- Tools and environments for application development, service creation, deployment, execution and management
- End-to-end monitoring of services.

This service segment can potentially become a volume business for operators in the future. It is expected that there will be a great many C&A providers that want to target consumers through the telecom networks.

3.1.2.1 Wholesale business model

There is another scenario in which the operator is a service provider, but to parties other than its own subscribers. These could include other Mobile Virtual Network Operators (MVNOs), service providers, operators or commercial applications that would use standard APIs such as web services or Parlay/OSA to access network functionality such as call and session control, location, and then link it into their own services and applications that they are selling outside the operator's customer base. As an example, an MVNO may offer a "proximity alert" service to its subscribers, but purchase location based service (LBS) information from several wireless operators to make this service work when subscribers are roaming.

3.1.2.2 Enterprise services

Enterprise business has much in common with the channel-provider business, except that the enterprise customer and not the end user pays the bill, so cost-effectiveness is a major competitive advantage. The traditional operator offering towards the enterprise segment has primarily been to support a company's internal business processes and employees with P2P services specifically adapted for the enterprise environment such as Virtual Private Networks (VPNs). This has later been complemented by similar services for employee access to company support systems and data. It is envisaged that the offering will be further developed for both these cases and complemented with new capabilities provided by the networks such as messaging and streaming, for example.

When companies target external users such as general consumers or professional users with direct value propositions offered via the operator, this is treated as part of the operator's channel provider services.

3.1.2.3 Impact on marketing process

The business models discussed above significantly expand the range of consumers to which operators will target their offerings. Until recently, most operators were dealing with mass markets that required heavy investments in development and deployment before a service could be brought to market. As a consequence, the operator's marketing process consisted of significant "pre-sale" market studies before such investments were made.

In an environment where services can be developed quickly, purchased off-the-shelf or sourced from a service provider/service aggregator, and the deployment costs become minimal, many operators will be able to adopt the "post-sale" retail marketing process, which places much more emphasis on watching the sales figures to determine which services are successful.

In the channel provider business model, the operator could also market specific competencies as partnering programs rather than end-to-end products. Customer base, efficiencies of customer-management processes,

alliances with other operators, flexibility of integration and scope of enabler offerings become major value-added advantages and thus key elements of the market message to channel partners.

3.1.2.4 Manage partners and suppliers

From the network perspective, the Service Layer includes three worlds: the content/media world, the operator/service-provider world and the consumer/enterprise world. Telecom and IT vendors, handset manufacturers, operators, content and application providers, developers, system integrators, users and enterprises are all involved in the Service Layer at some point. In this rather complex world, partnerships have to be forged between vendors, operators and content and application providers in order to deliver compelling person-to-person or person-to-content services.

In this environment, the operator has to provide both the technical infrastructure that can integrate all the pieces efficiently into a single functional service and content supply chain, and the business infrastructure that permits all members of the value chain to play their separate roles in the most efficient manner possible.

3.1.2.5 Interoperability with other networks

The borderless scope of the Internet is also influencing user expectations of advanced services. When specific services become important in users' everyday lives, they want them to work even when they travel abroad. Many operators are participating in regional or global alliances to meet these expectations and provide subscribers all the comforts of home when roaming.

The ability to run services across operator and national boundaries has become a significant factor in the market acceptance of new services. SMS provides a good example of this – in country after country around the world, SMS has achieved true mass-market penetration only after interoperability has been achieved.

3.1.2.6 Charging

Real-time charging and payments as well as dynamic user and service management within service execution are becoming increasingly important.

The charging system addresses the operator's need to charge for any value that the network brings to customers and business partners, cost-efficiently and with minimum business risk, and to handle relations with these in terms of controlling the end-to-end flow of revenues in real time, and have this integrated into the operator's standard business support system.

Another trend is the convergence of the pre-paid and real-time charging markets, requiring a single system that supports the charging and payment solutions needed for all types of digital content delivery and associated

business models. The objective is to secure the operator's role as a payment provider and to make it easier for the C&A providers to utilize the operators' networks. The result is spending control for end users, and credit control and customer intimacy for operators.

3.2 Business process

In addition to providing services that users want, another key success strategy for operators is to deploy cost-efficient business processes that support the service segments described above, flexibly and profitably.

These business processes can be structured according to a horizontally layered model supporting the market and customers, services, resources and suppliers/partners. These include operations processes focusing on daily customer-related activities such as fulfillment, assurance and billing, and strategy, infrastructure and product support, for planning and lifecycle management of the operator's offering to its customers, focused on how to define, develop, implement, launch and withdraw services.

3.3 Other factors influencing operator business strategies

3.3.1 Terminal evolution

Just as server-based services are becoming more popular, so are terminal or client-based applications. Continuous advances in both server capabilities and devices – such as functions, built-in features, browser speed and memory – will make client-based services increasingly attractive for end users for certain applications, and server-based services more attractive for others. The terminal and available bandwidth will be the main drivers for many new services and lack of appropriate terminals or sufficient bandwidth will effectively delay take-off.

3.3.2 Integration with installed base

The players within the IT industry have traditionally dominated the service integration market. With the introduction of services beyond voice, however, many of the operational processes have begun to interact more closely with dynamic data in the service-execution environment, forcing the business support systems to adapt to real-time conditions and requirements – and this is where telecom vendors have competencies beyond what is usually found in the IT industry. Many telecom vendors have already responded by extending their competencies in IT system-integration processes either by partnering with major IT players or by expanding their own competencies.

3.3.3 Regulatory issues

As the consumer market for services beyond voice grows in importance and operators begin to act as distributors of content, we will also enter a new and unfamiliar legislative environment involving new aspects and consequences of areas such as consumer laws and VAT regulations. Such legislation has generally led to the further opening up of the market, as in the case of recent EU regulatory frameworks increasing possibilities for MVNOs.

4 Vendor selection strategies

Putting all the pieces together to create a Service Layer that supports the operator's business objectives is not necessarily a simple exercise. Because the Service Layer comprises offerings from a wide variety of vendors, an increasing number of operators are choosing "best-of-breed" selection strategies, and then opting to implement a multi-vendor service network. Some are choosing to have almost the entire service network hosted by aggregators and vendor partners.

This final section looks at some of the criteria an operator may consider in selecting the vendors and partners it will deal with. It is not meant to be a comprehensive list, and of course needs to be considered within the context of the operator's own business objectives.

4.1 Key values in the vendor offering

4.1.1 Vision and commitment

Vision measures how committed a vendor is to a market, and is a good indicator of how likely a specific partner will stay at the forefront of market evolution. The Service Layer is a very standards-driven business, so another key measure of vision is how active and influential a vendor is within standards bodies such as the Third Generation Partner Project (3GPP), 3GPP2, the Open Mobile Alliance (OMA), Parlay, Liberty Alliance and the World Wide Web Consortium (W3C). Finally, a clear vision will mean a more coherent approach to solving integration and interoperability issues.

4.1.2 A structured approach to Service Layer architecture

There is an immense number of options for implementing service networks. Having a plan for how to put all the pieces together in a multi-vendor context defines a structured Service Layer architecture that will make it easier, faster and less expensive for operators to broaden their offerings, deal with change, scale their solutions, and optimize the service life cycle.

4.1.3 A project-based approach

The Service Layer is not a monolithic entity but rather a community of elements from different vendors integrated one piece at a time according to a structured Service Layer architecture. A vendor that takes a project-oriented approach will focus on solving the operator's issues in a consultative manner, providing customized solutions to the operator's unique situation in terms of technical infrastructure and business processes. The solution is specified together with the operator after careful study to ensure an understanding of the prevailing market and business issues. This approach is proactive and requires mutual trust and confidence from both parties, as well as business and technical competence.

4.1.4 Reach

Another important consideration is the vendor's breadth of coverage over the operator's business systems, from services all the way to the end user. The broader the vendor's coverage, the more likely it is to understand the operator's business needs, and to be able to craft true end-to-end solutions. Broader coverage also makes it less likely to have problems integrating its offering seamlessly with the operator's existing infrastructure.

4.1.5 Depth

The Service Layer does not operate in isolation from the rest of the operator's network. Vendors whose offerings covers the operator's entire infrastructure from Service Layer to core network to access network are more likely to ensure that each works in harmony with the others to produce an optimal user experience, and offer the choices in quality of service, availability and interoperability that will support the operator's business objectives.

4.1.6 Product portfolio

A wide product portfolio is a good indication of both depth and reach, as well as a flexible approach to integrating these pieces into the operator's existing infrastructure. A "building-blocks" approach will provide maximum flexibility, while offering the opportunity to take advantage of pre-integration between new Service Layer elements, and a structured way to expand network capabilities over time.

4.1.7 Service portfolio

The needs and expectations of telecoms users are very different from those of Internet users. There is a whole body of knowledge that supports the delivery of services that work the way telecoms users do, and optimizes how telecoms

operators build business systems and networks to generate solid revenues. A key vendor value is the ability to provide consultative services to operators, so they can leverage wider industry experience and build on established best practices. These services may include:

- Consulting services such as business consulting, technology consulting, education and solution analysis
- System integration
- Managed services
- Customer support and solution support

4.1.8 Partnering strategies

One of the most difficult aspects of the “open Service Layer” model is building and maintaining a large developer network to generate services and applications for users. Some vendors have third-party-developer programs that already have a large set stable of tested services available. These programs may also provide assistance to developers in getting started and in testing their applications with simulators and other tools. Some even have marketing support for developers in their programs. A good example is Ericsson Mobility World, which supports developers by hosting a variety of software development kits for Parlay/OSA, OMA and other network enablers, makes a Parlay gateway simulator available and provides a Parlay application catalog and other benefits for program members.

Some of these vendor developer-support programs also work with application-server vendors to provide end-to-end tested services, and live network-testing facilities for services.

5 Conclusion

A well-designed Service Layer provides operators with a coherent way to build service and content-delivery infrastructures that support the needs of end users, new business models and drastically expanded supply chains. It makes it possible to integrate not just the familiar telecoms functions but also IT-oriented capabilities and service providers into the operator’s growing pallet of business tools. It also provides operators with the tools they need to deliver carrier-grade quality, low cost and flexible life-cycle management for new services, as well as getting the maximum value out of currently installed infrastructure. In conjunction with operators’ vendor and partnering strategies, it provides the vehicle for value creation and business success.

We believe this paper will help to clarify the Service Layer business, and has outlined some of the patterns and commonalities that we have identified from working with operators around the world.

6 Glossary

3GPP	Third Generation Partner Project
3GPP2	Third Generation Partner Project II
ARPU	Average Revenue Per User
C&A	Content and Applications
CTP	Content-to-Person
E2E	End-to-end
IMS	IP Multimedia Subsystem
LBS	Location Based Services
MVNO	Mobile Virtual Network Operator
OMA	Open Mobile Alliance
P2C	Person-to-Content
P2P	Person-to-Person
VHE	Virtual Home Environment
VPN	Virtual Private Networks
W3C	World Wide Web Consortium