A Service Delivery Platform for End-to-End Value Web Enablement

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End-user focused end-to-end Service Delivery Platform offerings are key to achieving real market and revenue growth through effective partner and service lifecycle management. Rapid and efficient rollout, operation and retirement of services support true service innovation. Adopting the end-to-end approach will allow operators to service-enable their subscribers. Subscribers become empowered and they can dictate the evolution of their own services. Pre-integrated internal and external enablers are the key to the construction of an effective, customised end-to-end SDP.

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EXECUTIVE SUMMARY

Traditional telecoms operators' business is being threatened by new entrants on a daily basis. The Internet is continually spawning new service providers that are competing with traditional operators for subscriber attention and cash. The Internet is flooded with enablers that allow service providers to design, develop, deploy and promote innovative and compelling services in an unlimited environment. The mash-up concept is creating offerings that are built using true service composition and orchestration. These competitors take many forms, from large multinational players to high school students, all using each others enablers to deliver compelling services. Operator value is continually being eroded. 'Telco grade' is now an obsolete term as Internet service providers' subscriber and transactions volumes surpass those of many operator competitors.

To win the war for subscribers, operators must invest in their armoury in the form of an SDP. The SDP helps replicate the enablers of the Internet within the operator environment, while also supporting integration with external enablers. The challenge is clearly that of retail service enablement. The Internet inherently supports open service delivery whereas operator networks were traditionally built to prevent it. Internet services are progressing at alarming speeds and those alarm bells are ringing loudly in the ears of operators. They have been left at the starting line, unable to move to increase ARPU as both feet are securely fastened to achieve stability and reliability. The SDP helps release operator networks and other assets to allow them to be used internally and externally to retail innovative, loyalty and cash generating services.

Operators must focus on their target market and their subscriber needs. The objective of this activity is to clearly identify the required set of service enablers required to support personalised subscriber activities. Operators have different needs depending on market segments addressed in specific geographic locations. Their respective SDPs should therefore include different enabler collections to support these needs. Market drivers may require a focus on enterprise communication services, media rich content services, innovative voice services, IM enabled services etc. Each operator, in each region, has a specific set of requirements dictated by subscriber dependencies. SDPs must therefore be configurable with plug and play enablers. However, future proofing is also a real consideration. Operators have learned from poor historical decisions and are anxious to ensure that their SDP strategy will support subscriber needs that are not yet visible and thus allow operators to rapidly grow and manipulate their service enabler frameworks.

Operators are adopting the approach of working with a number of key strategic partners to overlay their existing networks with subscriber enabling SDPs. There are many elements required to construct an SDP focused on diverse enabler providers. The SDP represents a mix of required competencies; presence, media mixing, device identification, personalisation, network abstraction, convergent charging, content management etc. The SDP can therefore be sourced in several ways, by partnering with one solution provider to deliver all elements or by adopting the System Integrator approach to cherry pick and integrate individual elements. However, a new more effective model for SDP construction is emerging. Individual, recognised enabler providers, completely focused on their core competencies, are pre-integrating their SDP enablers. This approach allows operators to construct a customised SDP that works out of-the-box and removes many risks related to technical integration.

INTRODUCTION

Fixed Mobile Convergence (FMC), substantial competition from Internet players, dwindling voice revenues, increased churn and a plethora of other substantial forces have generated the operator derived requirement for what the industry has commonly termed SDP (Service Delivery Platform). The term SDP refers to an architectural overlay applied to telecommunications infrastructure to address emerging service execution problems. SDP is intended to enable rapid development, deployment and retail of new converged multimedia capable services. From basic voice services to complex audio/video conferencing for multiplayer games to business related use cases. The SDPs currently being promoted to operators typically boast a service creation environment, a service execution environment, abstractions (enablers) for media mixing and control, presence capabilities, location provision and integration to OSS/BSS. They also provide unlimited simplified access to other low-level communications capabilities thus bridging the functions of legacy telecommunications networks and the Internet. SDPs provide the necessary underlying solutions that can be applied to both consumer and business service delivery. These services are increasingly focused on the integration of traditional telecoms and emerging IT capabilities.

Although many suppliers have traditionally provided communications integration interfaces and infrastructure, the cost-saving success of IP-based VoIP systems as replacements for proprietary PBX systems and desktop phones, has prompted a revolutionary shift in industry focus from proprietary systems to open, standards based technologies. SDP represents a tremendous selling opportunity for new systems from traditional vendors, and has also assisted in opening up the operator market to traditional IT vendors including BEA, IBM and Oracle. These companies are claiming to be developing, or to have developed SDPs of their own. The reality is that they do not have the competencies to develop all the enablers present in an SDP. They are of course starkly aware of this and have adopted the company acquisition approach to build up their enabler offerings. Furthermore, they are also creating partner programmes to facilitate partners in creating other enablers that will also form part of their SDP, thus creating an ecosystem for further acquisitions.

The key attribute of SDP is the retail focused, subscriber centric view that propagates through all constituent enablers. The SDP provides the point of user access to operators' converged services where their preferences and entitlements can be evaluated in real-time. Dynamic shared access to authentication, profiling, authorisation, balance management etc. ensures subscriber services and their associated device/location contexts are delivered appropriately. The core architecture of SDP should therefore define standard product, promotion, preference and entitlement business processes. SDP is customer facing not network facing – a side effect of traditional equipment vendors selling SDP. It supports operators in rapidly retailing services and letting the market identify the winners and, equally as important, the losers that can easily be retired.

SDP assists operators in modularising their networks and hence facilitate their inclusion in emerging value web of collaborating third party providers. It allows third parties to easily access operators' internal enablers to deliver services and share revenues. It also allows operators to attack and expand their market share in the traditionally IT dominated enterprise markets by providing extended hosted business communications services that support FMC and core enterprise specific applications. It helps operators evolve from network operators to service retailers and wholesalers.

THE END-TO-END SDP

The primary purpose of the SDP is to enable new services to be rapidly delivered and sold to subscribers. In many cases, subscribers service needs and expectations are driven by the Internet and other service access experiences. There are many service access channels available to subscribers including TV, radio, telephony, postal mail, Internet, Intranet and traditional human face-to-face interaction. Subscribers are demanding, or have an expectation to be able to access services delivered over these channels while on the move. A clear opportunity therefore exists for operators to provide mobile access to a wide range of products and services through mobile devices. This is a non-trivial task. The operator must adopt a whole series of enablers to support the delivery of these services. The dynamic identification of the subscriber need, the controlled acquisition of required third party capabilities, the integration with third party systems, the provisioning of the service, the personalised delivery of the service, the appropriate charging for the service, the revenue settlement with third parties and an abundance of other requirements clearly articulate the end-to-end requirements for SDP value web enablement.

To ensure the delivery of end-to-end functionality, including integration with legacy systems, an SDP must adhere to the following set of key end-to-end principles:

- Adhere to and integrate with business and operational processes.
- Abstract from network equipment dependencies.
- Support an aggregated user profile.
- Provide a service gateway for controlled partner access to SDP enablers.
- Include standard mechanisms for policy and SLA enforcement.
- Provide a high volume transaction execution environment.
- Provide full service lifecycle support – requirement identification, design, development, deployment, management, SLA enforcement etc.
- Constitute fundamental enabler elements e.g. media server, messaging, content management, call control, presence, location, discovery, personalisation etc.
- Adopt standard frameworks for developing and deploying additional enablers.
- Provide business intelligence and activity monitoring capabilities.
- Deliver out-of-the-box services for immediate ROI.
- Provide a core set of retail capabilities based on personalisation, promotion and advertising.
- Be standards compliant to support potential transfer of enablers across application servers e.g. JBOSS, BEA, Oracle etc.

Traditionally OSS, BSS and service delivery systems have been developed by separate organisations using disparate platforms, products, preferred vendors etc. within the same operator. This has significantly curtailed the ability to deliver and retail innovative converged products and services. This silo approach is no longer sustainable. End-to-end SDP principles supported by the move to Internet Protocol (IP) based networks, the emergence and adoption of open-standards based interfaces and the solidification of SOA IT standards are facilitating the creation of true plug and play based end-to-end service delivery environments.

The shift has facilitated the emergence of many SDP vendors, each with their own flavoured offering. Traditional vendors including Siemens, Ericsson and Alcatel continue to lead the market but other new entrants from the IT sector including BEA , Oracle and IBM have achieved several deployments. There continues to be much inconsistency in market offerings and consensus has not been reached on a standard model for an SDP, despite defacto definitions from standards bodies (e.g. OMA) and analysts (e.g. Moriana). The reality is that every operator requirement is unique. The critical factor for operator selection is that the adopted SDP provides end-to-end value web and retail support. The enablers present in the SDP must support the full service lifecycle for the actual services demanded by the operator's subscribers and the end-to-end SDP should form the basis of a service ecosystem to grow future offerings.

The Role of Service Oriented Architecture in SDP

Operators have clearly faced many challenges in their SDP developments, which have arisen both for technical and business reasons. A common problem is the organic growth of the "accidental SDP architecture". In this anti-pattern of system integration, operator systems communicate in an ad hoc fashion through mechanisms such as batch FTP transfers and bespoke equipment specific network protocols. The initial response from the industry to these issues was the introduction of hub and spoke type integration brokers, usually built on top of a proprietary message oriented middleware backbone or application server. These solutions have proven expensive and in many cases have resulted in vendor lock-in for the operators implementing them. They have also prevented operators from retailing compelling services with significant revenue generating potential.

It was recognised that a more flexible, open and abstract architecture was required. This need is addressed by Service Oriented Architecture (SOA). SOA is an architectural style created to achieve loose coupling among interacting enablers. A service can be described as a unit of work done by one or more SDP enablers to achieve desired end results for a service consumer/partner. In the SOA model XML Web Services provide a common communications fabric, which is utilised by autonomous service enablers. A service-oriented application is constructed through a collaboration of autonomous specialist SDP enablers. Using SOA, every enabler advertises a contract that describes the structure of messages it can send and receive as well as some degree of ordering constraints over those messages. This strict separation between structure and behaviour simplifies deployment. The Enterprise Service Bus (ESB) architecture stipulates a layer of organisation over SOA principles. This architecture describes a number of integration patterns for realising loosely coupled, event driven SOA enablers. The intention is to provide an open, standards based integration framework required to support SDP. A key driver in the uptake of ESB integration has been the OASIS development of Web services (WS-*) specifications. These stipulate composable enabler interfaces for service construction and orchestration within the SDP.

SOA adoption within the SDP allows service-oriented applications to be easily constructed through a collaboration of autonomous specialist enablers that are discovered through Universal Description, Discovery and Integration (UDDI) registries and accessed using Simple Object Access Protocol (SOAP). As well as constructing service-oriented applications from enablers within the operator SDP, composite Web services will increasingly involve collaboration with service offerings from many other external providers, and involve multiple trust authorities and distinct execution environments. SOA adoption in the SDP simplifies

enabler deployment and facilitates other SDP requirements for composition, reuse, delegation, orchestration, policy enforcement and business/operation process adherence and integration.

The Role of Standards in SDP

Key to the adoption of the SDP SOA based approach, is the fact that it is not tied to a specific technology. It focuses on the composition and orchestration of enablers with defined interfaces that can be called to perform their tasks under standard mechanisms, without the service having pre-knowledge of the calling enabler, and without the application having or needing knowledge of how the called enabler actually performs its tasks.

The critical technical underpinning of this capability is the definition of, and stringent adherence to well defined, open standards that facilitate the interaction of independent enablers into a cohesive whole that is capable of supporting rapid service innovation and stable, performant service execution and delivery.

In the mid to late 90's the enterprise computing space moved away from the proprietary client server model to a more open platform based on IP, HTTP and J2EE application servers. This evolution continues today with the adoption of SOA and ESB based architectures all of which are supported by open standards. The path in the converged space is similar, as operators move to an end-to-end all IP infrastructure and away from proprietary solutions. This move is facilitated by the adoption of open standards that address challenges particular to the SDP domain.

There are many standards that form the foundation stones without which SOA adherent SDP could not be achieved. The industry is embracing standards as the key mechanism to achieve integration on a technical level. This assists SDP implementers in constructing service platforms without having to adopt major project risks related to integration and short term delivery. Unfortunately, much of the standards for SDP are currently lagging behind the market. However, it is widely accepted that integrating custom APIs into a network is uneconomical and does not contribute to increased profit margins, especially for smaller operators and system integrators. The support of a set of stable standards is needed to improve the situation. Some progress has been made by the OMA in setting standards for policy control, but it is behind the state of development of the market. For example, TISPAN and 3GPP are working on the architecture for IMS, but IPTV is evolving separately, and it is unclear if this will be included by TISPAN. Web portals are being worked on by W3C and IETF, but not as a formal set of standards. Service enablers for IMS may be extended to include Web services, but that work is still to be completed by OASIS and W3C. Lower tier and virtual operators should therefore by selecting pre-integrated enablers as a mechanism to achieve efficient SDP construction in the absence of fully matured and stable standards for all elements. The adoption of proven pre-integrated product based enablers will dramatically reduce time-to-service and inevitably, integration risks and costs.

The Service Lifecycle

Adoption of SOA and the supporting standards outlined above, along with the transitional pre-integrated approach are key challenges to SDP realisation. It should be clear at this point that an all encompassing SDP to service the needs of all operators does not exist. The SDP can be viewed as an Operating System (OS) for services. Different enablers can be seamlessly installed and uninstalled without causing undesirable

effects. SOA, standards adherence and pre-integration replace the need for OS and hardware specific drivers. Services can be introduced into the SDP and just work. This is similar to the way one installs new applications on an OS and they automatically work and integrate/interact with other applications/enablers.

The key point to extract from this analogy is that the choice of applications to install on the OS is driven by clear service needs. For example, an OS user may have a need to create documents, share and discuss them with others. There are potentially several enablers required to fulfil this service need, a document editor, a file transfer program, a communications client, a browser etc. Furthermore these enablers may rely on each other for profile information (e.g. locale information) to support seamless transition. The OS itself is a collection of enablers (an SDP) that drive the hardware, maintains user profile information etc.

Similarly the operator's selection of SDP enablers is driven by the needs of the services that meet their subscriber requirements. To ensure that all of the necessary enablers are included in the SDP the operator must clearly interpret all the requirements for end-to-end service execution. To achieve this, the operator must clearly understand all the critical stages of the service lifecycle and demands that they create on underlying SDP enablers. The standard stages for any service include:

- Requirements identification - possibly automated through subscriber monitoring.
- Design - mash up approach to service composition.
- Development of service specific components for new services.
- Service dependant content ingestion.
- Integration with enablers and other service elements.
- Provisioning of network and other resources.
- Deployment on the network.
- Personalisation based on unified user profile and specific subscriber requests and usage patterns.
- SLA enforcement across all parties in the service delivery web.
- Activation on user accounts.
- Charging for usage - may be subscription based.
- CRM and Customer Service execution.
- Management of the service and its underlying content and resources - may include promotion and packaging.
- Upgrade of service through new feature releases and usability enhancements.
- Deactivation - when demand reduces or the service becomes obsolete or out of season.
- Un-deployment when service is fully retired.

The service lifecycle is iterative and subject to continuous extension as new enabler capabilities such as retail capabilities and personalisation are exposed through the SDP. The key objective from an operator perspective is to accurately align their SDP implementation with their real service needs, while always considering the evolution of services and the SDP. This will result in the selection of a set of enablers which are fundamental to future revenue generation through service realisation. End-to-end functionality is therefore a clear consideration and operators must ensure that the SDP constitutes the full set of enablers essential to meet the requirements of the end-to-end lifecycle, from requirement identification through to retail. The choice of supplier enabler should be determined based on proven integration whether it be standards based or through referable pre-integration activities.

SDP Enablers

The SDP is the operating system on which enablers are installed or through which they are accessed. Many enablers will exist in the SDP within the operator environment, while other enablers will reside on the Internet e.g. Google or Yahoo Web services. An enabler encapsulates one or more pieces of data or functionality that is purposely packaged to be easily integrated with other enablers or applications e.g. call control for click to call applications, unified user profile for single-sign-on/personalisation, location detection to expose subscriber position to applications and presence to indicate subscriber availability, all of which are required to achieve true, seamless service delivery. Vendors including Nokia, Ericsson and Oracle all agree that no SDP can be delivered as a pre-fabricated piece of equipment straight from the factory. Sets of enablers (and their suppliers) define and differentiate SDPs. Many of the factors affecting the selection of enablers have been highlighted in the previous sections of this paper, while other more restrictive conditions including vendor lock-in and legacy dependencies also dictate what specific enablers are deployed into any particular SDP instance.

A suitably furnished SDP can support operators' inevitable evolution into retailers and wholesalers of products and services. There are a number of enablers that are repeated across many vendor offerings and represent some key elements of any SDP. In addition to those listed above these also include enablers to facilitate service creation, service execution, media mixing and control, seamless integration to OSS/BSS and virtual PBX functionality. However, much referenced market forces are compelling operators to evolve into retailers. Hence, those that are to survive must equip their SDPs with enablers that replicate the customer enriching experiences delivered by best of breed online retailers including Amazon and eBay. A key set of SDP enablers to achieve customer focused retail SDP as depicted in Figure 1 is described in the remainder of this section.

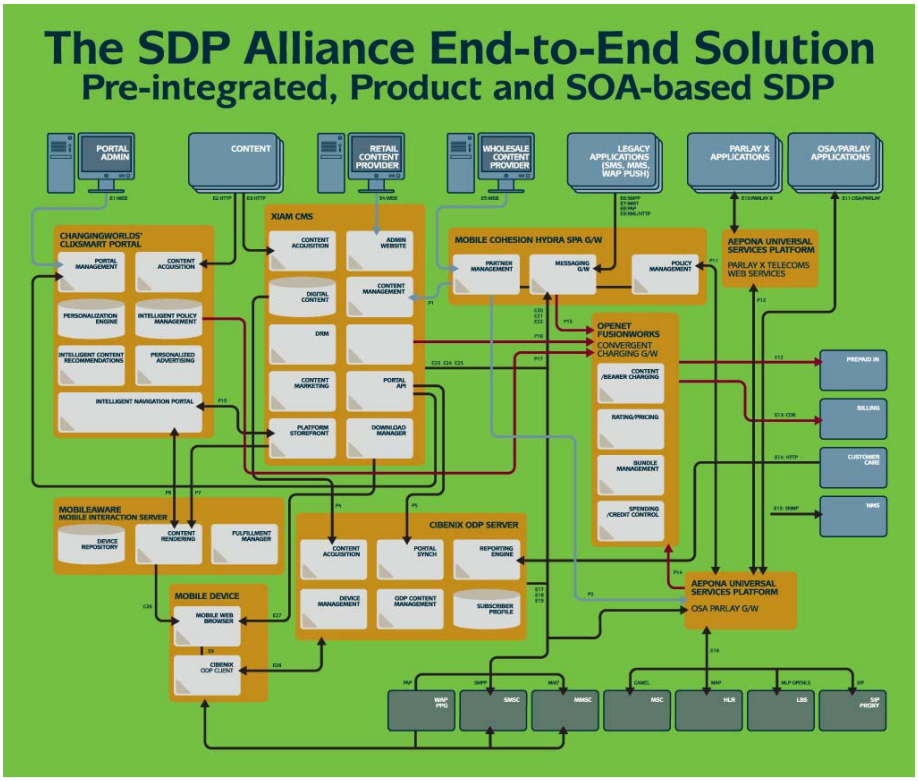

Figure 1: Logical Architecture for Customer Focused SDP

Partner Management
To meet growing subscriber demands for enhanced experience and choice, operators have to grow their service offerings. Hence, they need to rapidly grow their partner relationships. This creates a requirement for a partner management and policy control enabler. This enabler acts as a bridge between content and value added service providers on one side, and the operator network and other SDP enablers on the other. It enhances the speed with which an operator can make new cutting edge content and services available to subscribers, by allowing content and service partners to manage their own service lifecycle through a high level of Business Process Automation (BPA) within the IT and network environment. It allows partnerships with service providers using a variety of different business models, enforcing a specific Service Level Agreement (SLA) with each partner. This enabler also defines and tracks business relationships in real time, minimizing revenue leakage and achieving more profitable partnerships.

Personalisation
With SDP enabled continual expansion in range of services, operators also require enablers that support automated, dynamic personalisation of content and services to fulfil subscribers ever growing usability and convenience expectations. This enabler monitors users and routinely adapts the navigation structure of mobile portals for individual users based on the accumulated user profile and intelligent processing of navigation and usage data. This reduces click-distance (the number of scrolls & clicks to reach desired content and services), reduces navigation effort and significantly improves portal/service access and usability. These enablers monitor user activity, construct rich user profiles, and actively personalise the access portals for each individual user, dynamically adapting individual menus in response to the needs and preferences of each unique visitor. This is achieved by lending 'intelligence' to different aspects of access portal interaction. The user experience is significantly enhanced and ultimately more productive, both for the end user in terms of reaching his/her service consumption goals, and the operator in terms of driving service usage and revenues.

Device Identification & Rendering
The ongoing proliferation of services and associated content achieved through SDP, further fuels the challenges of interoperability and compatibility across subscriber access devices. A JSR-188 Composite Capability/Preference Profiles (CC/PP) compliant enabler is required to address these challenges. The enabler transforms Web-based content and business applications for optimised delivery to any device. It addresses the challenges of rendering all types of content and service UIs on any device by providing runtime device detection, identification and content transformation.

Service Discovery
An on-device enabler is also required to compliment the device identification and rendering SDP function. On-device portals are required to enable operators to make services more visible and more accessible to their subscribers, thereby increasing the usage of these services and driving ARPU and profitability. Operators are missing the vital link in the delivery value chain – the ability to bring their content offerings direct to the subscriber's device, thus reducing (or eliminating completely) the need to browse the online portal. The on-device portal allows the mobile device itself to become the storefront for mobile content and services. The flexibility and openness of this SDP enabler allows the operator to leverage any of the following elements:

- Menu-driven service discovery: allows subscribers to navigate through a hierarchy of offline menus (grid, list, wheel, popup etc.) before seamlessly linking to an online network service or to an offline service or application.
- Service promotion with pushed content: promotional, informational or advertising content is pushed to the device and presented to the subscriber through a non-invasive teaser carousel or tickertape.
- Multimedia content preview: present rich image, audio and video offline samples to the subscriber, allowing immediate preview with zero latency, and one-click purchasing of the content online.
- Background download and offline services: the silent pushing of content to the device, in order that the entire service (not just preview) can later be consumed offline by the user.

Retail Capabilities
Increased amounts of content and services also require a set of enablers to allow operators to automate marketing and promotion, capitalise on cross-selling opportunities, and sell services directly to individual subscribers on a one-to-one basis. They complement operators' existing environments by unifying views of complex mixes of services and diverse subscribers to achieve higher levels of penetration. This enables proactive, real-time promotions that drive the uptake of content and services. These enablers are critical for operators if they are to replicate highly successful online retail capacity of world leaders like Amazon.com.

Advertising
As operators adopt retail enablers, the focus switches away from observing the subscriber as a SIM card in a single customer segment, to an individual with likes, dislikes and traceable behaviour patterns. The unique operator capability to perform detailed profiling of individual subscribers is hugely valuable to all advertisers seeking new, highly targeted methods of getting their message to the right people. Enablers are required to produce and use this information to automate the management and delivery of targeted adverts directly to individual subscribers' handsets. This includes enablers that allow third party advertising partners to create and deploy adverts. The advertising capability opens a new highly profitable revenue stream for the operator.

Convergent Charging
Operators must also consider the most critical enablers required to capture revenues generated through its SDP enabled services – charging and billing. It is clear that existing/legacy operator solutions can not inherently support these emerging requirements. Replacement or complimentary enablers are required in the SDP that enable operators to deliver any service to any type of subscriber, and to enable any kind of payment to be collected or authorised before service delivery is actually executed. These enablers obviously need to work in collaboration with all other SDP enablers to facilitate real time access control, rating, authorisation, charging, billing and payment.

Content Management
There is also a clear requirement for enhanced content management capabilities within the SDP. The range of content ingested by operators continues to grow and will be further stimulated by the introduction of the SDP. Content management enablers include support for sourcing, storage, processing, subscription, scheduling, streaming and delivery of content and services in collaboration with other SDP enablers. They support the standardised and automated provision of rich portfolios of content and applications on the network. They securely and intelligently catalogue and efficiently store a myriad of content types in a assortment

of relevant formats, while also enriching content by optimizing it for particular devices. This SDP capability must also cater for the ever increasing demands related to digital rights management and the convoluted reporting for same.

Content Marketing
The SDP must also include enablers that support a rich content vending environment that communicates to individual subscribers. With so much digitised content available in so many different formats, and the inherent limitations of the mobile device, operators must employ automated marketing techniques to guarantee relevance and quality of experience to their users. Put simply, operators must make the adoption of services an easy and pleasurable experience. This requires the use of content marketing techniques that go beyond simple one-size-fits-all offers on the portal. To be successful in driving usage and adoption of mobile content, these marketing enablers must incorporate a range of capabilities in a number of core functional areas:

- Subscriber profiling and content cataloguing: providing an extensive architecture to support the capture of relevant subscriber usage and profile information and content metadata.
- Recommendations: incorporating advanced analytical techniques for the generation of relevant content recommendations.
- Campaign Management: providing marketers with an intuitive interface to manage the creation, execution, monitoring and reporting of content marketing campaigns.
- Campaign fulfilment: providing the software tools to execute campaigns using all relevant mobile technologies in a manner which provides flexibility while ensuring quality of customer experience.

Network Abstraction
To facilitate the much promised proliferation of services on converged networks, operators must learn from the Internet model and open up their networks to third party application vendors. Hence, the requirement for an OSA Parlay/Parlay-X gateway that establishes a carrier-network set of open entry points in the heart of the converged carrier network (with access controlled by the partner management enabler). This gateway acts as an integration backbone between internal and third party service creation and network resources. The abstracted APIs allow application servers to gain best of breed network integration - and underpins the operators' SDP. It offers application developers an abstracted and secure view of a variety of network technologies. This allows solutions to be developed independently from the underlying technology and protocol variants. In the past, operators developed new services and applications using specialist developers with knowledge of proprietary telecommunications systems. The network abstraction enabler(s) makes the processes of developing new services and applications easier by opening up the network to a wider pool of application developers with little or no specialist telecommunications knowledge, thus allowing operators to wholesale these capabilities.

There is currently much industry activity in relation to IP Multimedia Subsytem (IMS). IMS can be viewed as a prescribed set of enablers and is therefore highly complimentary to SDP. IMS supports enhanced capabilities by providing enablers including SIP application enablers, presence enablers etc. These IMS enablers assist the operator in achieving seamless integration between internal and external enablers using IP as the common element between them. IMS enablers are not fundamental to an SDP but, along with other enablers mentioned above, will essentially stimulate the evolution to end-to-end value web enablement for next generation service delivery.

OPERATOR REQUIREMENTS

Clearly operators must evolve to achieve revenue growth and revenue channel diversification. They must clearly identify the assets that differentiate them from competing service providers and build SDPs that leverage same. The most desirable outcome is that operators will have the ability to collaborate with these providers and collectively deliver subscribers with truly compelling service offerings. However, in an effort to defend its position in the value web, the operator must maintain full ownership of the key following attributes of their unique position:

- Subscriber identity – they can actually validate the name/address of the subscriber.
- Online and on the ground presence - many operators have high street retail outlets or partners that can touch/be touched by subscribers.
- An intimate relationship with subscribers - that provides them with information about subscribers' home address, family members, friends, payment mechanisms, spending power, etc.
- Subscriber trust – subscribers trust operators and look to them for verification and validation.
- Subscriber location information - live positioning from the network, home address, work address, frequent holiday/travel destinations etc.
- Device status – online/offline/busy.
- Knowledge of device capabilities - subscribers either purchase from operator or are required to specify same.
- Billing and charging relationship - which can be exposed to collaborating providers.
- Access to live and historical usage data - that can be transformed into critical user profile information.
- Single sign on and identity federation - the handset is the subscriber's key to access all services, no further authentication is required as the handset is a personal device that is not commonly shared or highly susceptible to external interference.
- Trusted access to user devices - to provide automated provisioning and service set up tasks.

The SDP is the necessary infrastructure that allows the operator to exploit these assets to meet impending needs and build sustainable competitive advantage. It allows them to achieve rapid service execution time and maintain first mover advantage. It offers them the ability to select pre-integrated solutions built on demonstrated technologies and solutions with proven scalability and performance to significantly reduce project risk. The adoption of standardised open enablers also reduces vendor dependency and will drive down service rollout and ongoing maintenance/operating costs. The SDP also addresses many other emerging requirements including seamless support for new services, conversion of existing assets with significant operating costs into revenue generating enablers, lower cost of integration with legacy systems etc.

Critically, operators must continue to defend their single biggest asset – the relationship with the customer. To achieve this, the operator must continue to win subscriber trust by delivering tailored services to them that they can easily use, when they need them. Operators have the opportunity to finally become the one-stop-shop for services. The SDP enablers mentioned above facilitate the operator in embracing unlimited amounts of services and automatically matching them to user needs.

CONCLUSION

Over the past few years the industry has been subjected to much debate in relation to the next killer application after voice and SMS. Many have proposed that operators should not focus on the killer app but more on killer capability. SDP is the required capability. It facilitates previously unachievable timelines for the execution of the service lifecycle. This enables the rapid identification of truly compelling services and easy subscriber access to them. The result is increased subscriber loyalty and ARPU.

The impending challenge is to construct an appropriate SDP and populate it with the relevant enablers to support market aware services. The SDP is the operating system and the enablers are the installable applications. To achieve this, SDP providers should be making their core SDP elements e.g. application servers, network abstraction solutions, messaging centres, presence engines etc. freely available to enabler providers. Enabler providers should be heavily engaged in pre-integration into these SDPs and, more importantly, integrating with each other. Only by engaging in these pre-integration activities will vendors be able to deliver on the promise of out-of-the box SDP end-to-end value web enablement. Operators that make the leap to a mindset where they can build out their SDP by browsing the Internet will enable their subscribers to build out their service portfolio by browsing their personalised operator portals. The general success and widespread adoption of the Internet can be somewhat attributed to the fact that users can easily find and use services. Operators must therefore replicate and improve on this experience to win subscriber attention.

The functionality of each enabler will compliment or support the capability of other enablers on the SDP. Hence, it is absolutely critical that they automatically interoperate, where possible. The only real mechanism to assure this is to adopt an enabler selection strategy based on pre-integration. In simple terms – only select enablers with demonstrated pre-integration. Those that do not choose to adopt the many associated risk and an extended time-to-service.

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