Stratecast A Division of FROST & SULLIVAN

Mediation Redefined
This Goes Well Beyond Billing

December 2010

TABLE OF CONTENTS

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EXECUTIVE SUMMARY

Real-time interactive communications services such as telepresence conferencing, mobile banking, distance learning, high-definition IPTV, medical device monitoring, mobile entertainment, social networking, and mobile applications make life better for consumers and business customers alike. These "life changing" services come in multiple varieties and combinations. The rate of change in network and user device evolution, combined with regulatory transformation and partner/supplier collaboration, has created a world of both opportunity and challenge for the global Communications Service Provider (CSP) marketplace.

While the promise of more customer exposure and, therefore, increased revenue opportunity are easy reasons for CSPs to embrace today's market changes with vigor, adjusting business to incorporate technology change and other advances in "service enablement" carry a sobering behind the scenes reminder. More user devices, more interactive services, and an enhanced ability to deliver more information faster and better continue to push the volume of user-generated data to unprecedented levels. As such, business and operations support systems are reaching peak design limits. With additional data volumes, typically doubling every few months, change in business strategy and in the way installed systems are engaged is essential for keeping customer satisfaction high and the cost of operations in check with both revenue and shareholder expectations.

As daunting as the need to transport customer data from anywhere to anywhere may be, it is equally challenging to account for what information customers are driving to which locations and, to a certain degree, for what purposes. This means collecting an understanding about each transaction, validating which ones are important, aggregating the lower value ones into more significant events and, in some cases, correlating them with other data sources, as business needs dictate. Due to volume limits and customer acceptance, Operations Support Systems (OSS) and Business Support Systems (BSS) are tasked with processing massive amounts of data, often in as near real-time as possible. Business functions most impacted today include: rating & charging, service quality assurance, customer satisfaction management, partner management, provisioning, fraud, revenue assurance, and market-focused business analytics.

This report reviews the key drivers that are pushing user data volumes to never before realized levels including a look at how other industries incorporate telecommunications—especially mobile access—into the goods and services delivered to their customers. It highlights some of the new business models that will push user data volumes even higher. The report draws out a list of challenges that must be solved if the changing business dynamics are to be addressed successfully, and defines many of the key requirements a real-time transaction data collection and processing platform should exhibit for managing the user data challenge. It will also show how one supplier of such systems—DigitalRoute—meets many of these concerns in the evolving multi-purpose mediation marketplace.

INTRODUCTION – OUR REAL TIME DATA-INTENSIVE WORLD

The changing communications marketplace continues to emphasize customers—consumers, business customers, and enterprise users—as evidenced by an evolving universe of customer life changing services. Anyone who has experienced an interactive smartphone application, watched mobile TV, uploaded or downloaded user-generated video, or engaged in a range of different remote medical monitoring services will say that life today is much better than just a few years ago.

Customer life improvements, shown in Figure 1 below, happen in a number of ways. Better user devices and network infrastructure updates enable mobile broadband connectivity that rivals anything obtained through a fixed-line connection. With this increased capacity, the user experience improves through better video imaging and internet sessions. In turn, it changes user behavior from a static "words and pictures" environment to "video everything" that includes both studio-created and user-generated content. Technology advances have also facilitated social networking, which has permanently redirected the way people associate, from business-level telepresence to one-on-one personal experience sharing.

Figure 1
Customer Focus and Real Time Services are Today's Business Reality

Source: Stratecast

Today's new technology, advances in customer applications and downloadable mobile content bring a heavy burden to the CSPs that must deliver a growing amount of user traffic to anywhere, at anytime, and on any device. ***Managing the current surge in data traffic volumes is possibly the most significant business and technology challenge since automated systems—OSS BSS—were created more than 30 years ago. The real-time and massive scale processing aspects of today's user traffic volumes are challenging the core design limits these systems were built upon, and on which the core business functions of proper accountability, definable monetization, and continued customer satisfaction are based.***

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A BUSINESS LOOK AT THE EVOLVING COMMUNICATIONS MARKETPLACE

Data-Centric Mobile Device Technology

Customer engagement with multiple applications in an always on, always connected mode through laptops, tablet PCs and smartphones is dramatically increasing as feature functions expand, usability simplifies and device costs fall. Advanced smartphones, especially the iPhone and iPad, now have an extended reach to new user groups, as young as 2-year-old children, who know how to access a folder of downloaded videos or recent photographs on their parent's devices. Children as young as three now have their own iPad, with parental controls, to access and interact with their favorite entertainment and learning applications. Downloadable content from Apple's iTunes, Nokia's Ovi Store, and numerous app stores for Google Android number into the hundred's of thousands.

Laptop computers and smartphones working on mobile networks represent a key driver of the transaction volume explosion that is affecting all CSPs globally. For example, a 3G or 3G+ smartphone, using applications not supported by earlier generations of user devices and network technologies, will easily create the same level of transaction data as 10 basic feature (2G) phones. A laptop, equipped with a mobile broadband aircard, has been estimated by some[1] to generate as much usage traffic as 1300 basic feature phones. This stems from the always on, multi-window, and multi-website connections that a typical user will likely have in operation. ***The net effect is a 1000% - 2000% increase in data usage transactions generated per customer when compared to those using a basic feature mobile phone. This increase is for simple service functions and would not account for any increases in usage data volume as a direct result of applications that would need to communicate with remote sites.***

Network Infrastructure Improvements

Mobile network technology continues to evolve as a means for providing customers with faster access to information and to improve response time of interactive services. Advances in network technology also help CSPs to more cost effectively address customer usability concerns by improving throughput capacity.

A significant challenge all CSPs now face is in operating multiple generations of network technologies to meet the service needs of their customer base. This means transaction volumes from each technology type have a compounding effect on the level of user transactions installed OSS and BSS must handle. It also means that during the timeframe when such technologies are simultaneously in operation—for GSM this includes 2.5G (GPRS/EDGE), 3G (UMTS), 3.5 G (HSPA), and 4G (LTE)—user data volumes must be collected and possibly aggregated from one technology type and then correlated with transactions from another as customers "roam" between technology domains depending on network coverage areas. For example, as 4G evolves, there will be significant in-session transition between a 3G connection and the newest 4G LTE network.

With 4G, another data generation factor is the way the network is engineered and installed. 4G networks bring a separation in many network node functions with a net effect of more nodes needing to be tapped than previous technologies and a requirement

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[1] Cisco report *"Hyperconnectivity and the Approaching Zettabyte Era"*, June 2010

to aggregate and correlate this data by customer. ***Some CSPs have estimated that 4G LTE will bring a 10X increase in data traffic volumes compared with a currently installed 3.5G counterpart. For example, the latest data usage estimates by a European CSP planning to upgrade its mobile network with LTE technology will result in the generation of approximately 40 billion transactions per day for a customer base of approximately 5 million subscribers; exactly 10X the 4-5 billion transactions per day generated today.*** This estimate does not account for the increase in customer usage of data-centric services, which will generate even higher transaction volumes.

Fixed-line and Mobile Interactive Applications

A new generation of interactive entertainment such as user-generated high definition video, mobile TV, mobile gaming, social networking and studio produced video-on-demand, are some of the reasons customer-generated data volumes are rapidly increasing. Mobile device users see this as an extension of what is done through a fixed-line connection, while fixed-line users see this as an expansion of the usefulness of an unlimited internet subscription.

Stratecast believes there are a number of ways both fixed and mobile applications will have profound impacts on user transaction volumes. For example:

- ***Service Substitution, Technology and Data Download Service Plans*** – For a growing number of users in the "under 30" demographic, internet-based fixed-line TV and VOD are now considered a serious replacement for subscription broadcast TV. Further substitution is likely if regulatory conditions favorably allow downloaded content to be transferred from one technology to another "on -the-fly," as continued convergence enables video consumption on any device regardless of which network technology initiated the transaction. Mobile TV is in its infancy within many global markets. As it grows, especially if the broadcast TV model evolves to a more interactive setting by mixing it with internet-based content, consumer interest will increase and higher transaction volumes than those projected in a later section of this report will be the ultimate outcome.
- ***Remote Site Access by an Application*** – Minor changes in the way an application works can have major network capacity consequences. For example, very recently the Google search engine incorporated predictive search capabilities within its "instant search" application for smartphones. With each character input, a send/look-up/return M2M communication is implemented between the user's mobile device and the Google search farm. With an average mobile subject search of 8-10 characters, the number of user-specific transactions as an aggregate total for all mobile users now increases, by several orders of magnitude, over what would be generated by a single search command application.
- ***Changes in How Customers Engage in On-line Gaming*** – The overall video gaming market is still mostly an off-line experience. If on-demand gaming grows in significance in the coming months with the current user audience and/or if a larger number of consumers are attracted by newer content, "gaming" will likely

add a significant amount of user-generated data to the volume levels projected in a later section of this report.

- ***Social Networking*** – Many of the under 30 crowd sincerely believe that instant availability and always connected with select friends is a normal part of everyday life. Through social network sites, such actions further drive the data transaction challenge especially when customers subscribe to flat rate mobile data plans and heavily participate in video/picture posting, instant messaging and even email.

Making Life Better in Multiple Industries

Numerous industries such as healthcare, education, transportation, and public services, as shown in Figure 2 below, are finding ways to embed mobile communications into tgoods and services they provide to improve their customer's experience. For example:

Figure 2 –
Reach of the Evolving Communications Marketplace to Other Industries

Source: Stratecast

- ***Publishing*** – College textbooks are now alive; not just as a simple PDF download to a PC, iPad or Kindle. For the iPad specifically, specialized suppliers offer interactive textbooks, where teachers can raise questions and students post comments about a particular paragraph or subject line. The cost for electronic textbooks is becoming less than the price for published versions, through reduced printing and distribution costs, while increasing the learning tool effectiveness for students of all age categories. Although issues remain, especially tied to programming costs and data usage volume generation, a revolution in how textbooks and other training materials

are written, produced and used is just beginning. The interchange of customer data with the "live textbook source" makes this a new beginning for the publishing and educational sectors.

- ***Healthcare*** – Storage and secure access of data focused around the patient instead of the health care provider is a growing trend. A recently implemented solution involves authorized access of complex medical images on mobile devices by medical professionals anytime and anywhere. It has the potential of significantly reducing hospital operations costs while delivering secure images and medical reports to those that need them; especially in urgent situations. Other examples include use of remote sensors to monitor patient status during periods of intensive medical care. Still others involve remote monitoring of health assistance devices such as heart pacemakers, glucose meters, and even prosthetics.

  As in the publishing example, the volume of machine-to-machine (M2M) and machine-to-human-to-machine (M2H2M) transactions are rising exponentially as the number of business uses grows, the frequency of data generated per device accelerates, the amount of data generated per reporting interval increases, and the need for such devices reaches main-stream reality. Some estimates show communications-enabled health-care assist devices reaching into the tens of millions over the next five years. It has already started in Western Europe, parts of Asia Pac, and North America, with imminent expansion to other geographies in the months ahead.

The enterprises engaging in such strategies have expanded the product or service reach of their core customer offers with a net result of increased user data volumes across potentially different networks.

While there are numerous examples that can be discussed, mobile communications have improved the usefulness of many products and services, from multiple industries, in making life better for both business customers and consumers. The enterprises engaging in such strategies have expanded the product or service reach of their core customer offers with a net result of increased user data volumes across potentially different networks. ***This means an added dimension of understanding of the type and amount of data from external content sources that must be correlated with network related information to obtain an end-to-end view of the customer experience. It creates yet another challenge for most installed OSS BSS, which were never designed to address such customer and service requirements.***

Changing Business Models – Rise of the Cloud

Business often turns to technology to solve strategic issues. Many organizations now look to cloud computing as a means to meet a new level of customer need driven by technology evolution. For example, activating on-demand computing functionality; boosting broadband capacity above baseline levels whenever needed; enabling customers to gain access to existing enterprise products via embedded mobile communications; and facilitating new service offers by combining components from one company with those from another are just a few ways in which new cloud-based services appeal to consumers and business customers alike. They each have unique challenges relating to proper accountability, security, provisioning, monetization and customer experience.

Cloud-services that involve multi-industry collaboration bring perhaps the most difficult data management challenge of all. Here, to make such services a customer reality, information provided from one or more industries must be delivered at the right time and to the right place across an always on and always available broadband connection

that many simply take for granted. For example, it could be a unique combination of virtual resources from multiple healthcare clinics and suppliers to better address a hospital's growing patient needs. It could be a textbook published as an interactive "live application" designed to work with very specific user devices involving both teachers and students in an interactive learning experience. It could be a group of utility operators or any number of other new business definitions from different industry suppliers, as shown in Figure 3 below.

Each business scenario requires a level of data orchestration and accountability different from the next. In nearly all cases it involves a real-time interaction between suppliers. Such service offers can have multiple low-value transactions that must be summarized to create a meaningful event, or it can be a single transaction sent to a policy controller or rating engine as the service is used by the customer. The net result involves multi-supplier data combined with details about the broadband connection to deliver a quality customer experience with proper accountability for the CSP, business partner(s) and customers.

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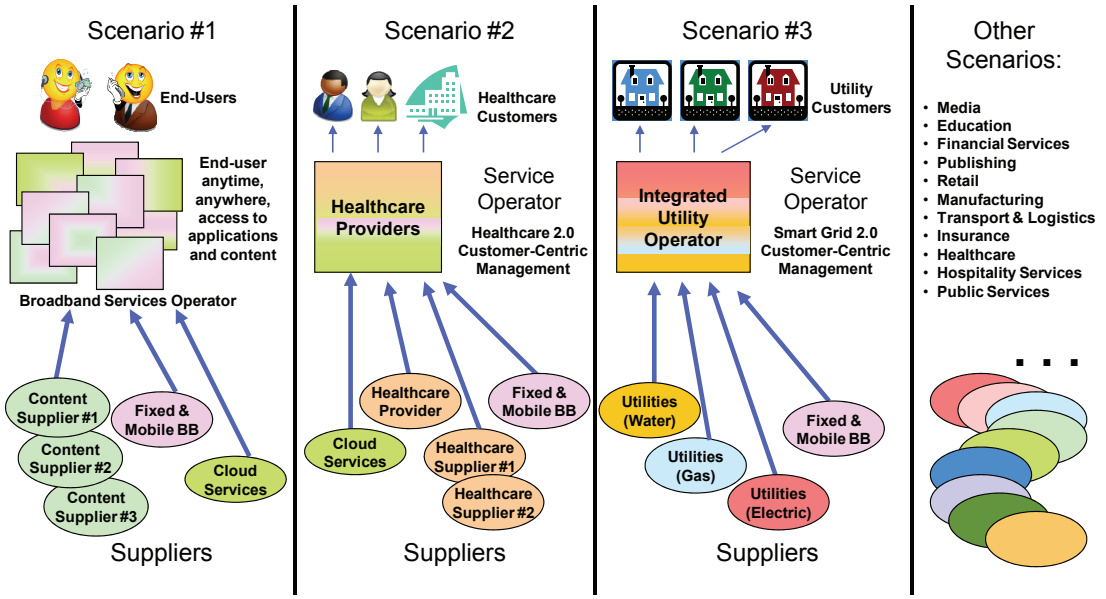
Figure 3
Data Consistency Needs from Multi-Industry Business Models



Source: Stratecast

Due to the common need for a fixed or mobile broadband connection to support a growing list of potential business-to-business-to-customer (B2B2C) scenarios, which will be a major reality in all parts of the world within the next 12-14 months, the CSP community is brought into the role of end-to-end service orchestrator. This means that, in addition to the usage transaction issues associated with greater use of broadband networks (fixed or mobile), CSPs must account for data transactions between each participating "part" of a service. ***It involves the combination of normal CSP network traffic data with partner information, processed through a decision making function that will often require a bi-directional flow of information between the CSP and participating supplier partners, to meet service definition and customer***

usage expectations. The bi-directional real-time aspects of multi-industry collaboration services will likely challenge even the most advanced OSS BSS installations and exacerbate a growing list of issues within most business and operations management functions.

Machine-to-Machine and Human-to-Machine Communication

Looking out 24-36 months, Stratecast believes personalization services will expand and improve the way people communicate. Universal language translation and even 3D holographic communications are not that far from implementable reality. Each will require sizable levels of data capacity for proper operation. In addition, advances in automated machine-to-machine (M2M) communication from all industries will contribute significantly; well beyond simple flow, pressure and time management functions often thought of as M2M today.

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Many personalization services will drive up the volume of user data traffic across a network and, in many cases, will actually increase the average value per transaction as many will carry a monetary value. They involve Near Field Communication (NFC) technology and other standards such as Bluetooth and Radio Frequency Identification (RFID). Examples include:

- ***Human-to-Machine (H2M)*** – NFC has been operational for a number of years in Japan. It allows mobile users with an NFC-enabled handset—2.5G+ devices—to purchase transportation tickets, interact with "smart posters", and complete small value vending machine transactions such as candy bars, juice, snacks and soda. Outside of Japan, several countries in Europe, North America and Asia Pacific have conducted mobile payments trials over the past two years. It's in inevitable that increased H2M transactions involving NFC will become a reality as more mobile user devices with NFC capabilities, including Android-based devices, are brought to market in the weeks and months ahead.
- ***Machine-to-Machine (M2M)*** – Products and some services, in multiple industries, use RFID, NFC, and dedicated 2.5G/3G mobile links or SIM cards as a way to improve the quality and ultimate customer experience of the goods or services sold. These include medical condition monitoring, transport of gauge and sensor data from undesirable or inaccessible work environments, connected home appliances, remote security monitoring, and supply chain fulfillment (vending machine restock according to expiration dates or completed transaction sales). A very leading-edge example includes advanced telemetry for mass transportation, wherein Google has already logged thousands of miles in driverless automobiles guided by radar, GPS and purpose-defined analytics.

  With advances in convergent billing systems, an adjustable threshold can be set by the CSP or individual subscriber as to when low-value transactions (e.g. vending machine sale of snacks or soda) are aggregated to a more valuable usage event that would be processed against a pre-defined limit within a postpaid account. This eliminates previous problems with micro payment processing costs that would often exceed the value of a transaction.

- ***Machine-to-Machine-to-Human (M2M2H)*** – Includes the accumulation of data transactions from multiple industry sources for human notification or option selection. Smart Grid offers involving combined utility consumption (water, gas, electricity, even mobile broadband) billing or notifications, when consumption levels fall out of "normal" levels, fit this category. It also applies to automobile internal component interactions or automobile external communication with smart infrastructure—roads, bridges, emergency services, and traffic control points.

As the M2M movement gains further momentum, Stratecast believes it will have a profound impact on the total volume of transactions that will traverse any network. Even more challenging perhaps, is the need for not just collecting and validating such transactions, but in correlating them with network-generated data that must work collectively to deliver an enriched customer experience.

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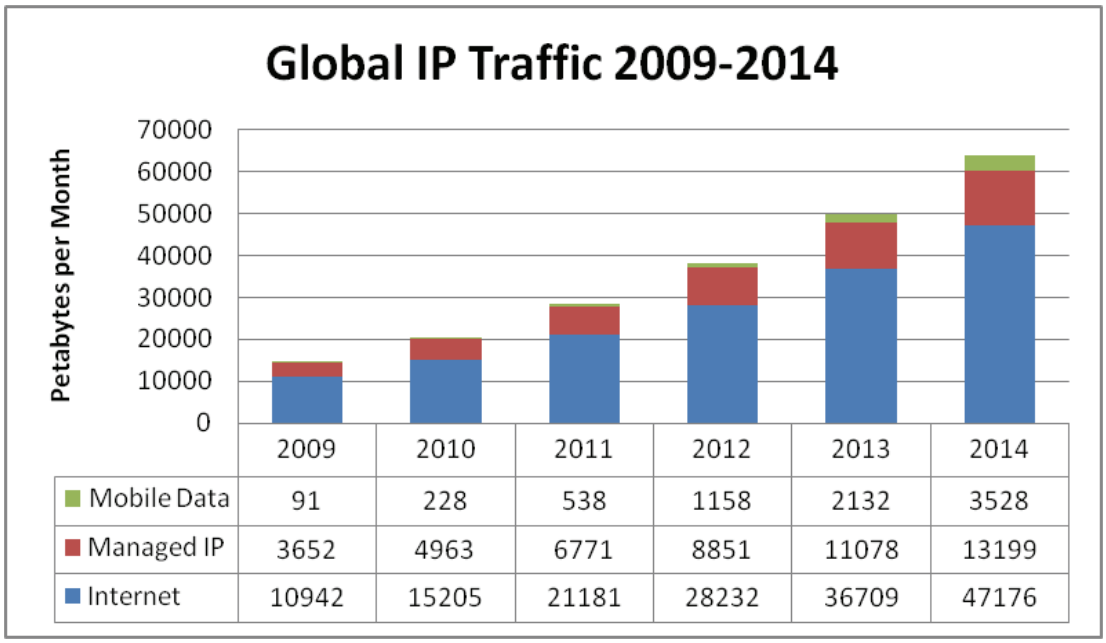
The Network Traffic Volume Explosion

A few years ago many wondered if the fees paid for 3G mobile licenses would ever show a return on investment as user data traffic was so miniscule. Fast forward to today. CSPs now struggle to keep the cost for supporting exponentially increasing data volumes balanced with collected revenues. Quantification of this global challenge is defined in Figure 4 below. While it is a reflection of IP traffic only, it provides a keen understanding of this growing business concern. It also represents an aggregation of insight from several industry sources and brings together the following observations:

- Mobile data traffic will double globally every year from 2009 through 2014 at a 108% CAGR. Mobile video will grow at a 131% CAGR for the same period, accounting for over 60% of the world's mobile data traffic.
- By the end of 2010 global internet video will surpass peer-to-peer (P2P) as the largest internet traffic type. This is evidenced by the rapid rise in user-generated video, substitution of VOD from broadcasters to content creation or aggregation sites, and the near-continuous use of social networking by users of all age categories through both fixed-line and mobile connections.
- North America, Western Europe and Asia Pacific accounted for 85% of all global IP traffic in 2009, but will collectively fall to 82% by 2014, as other geographies increase use of internet-based services.
- Consumers accounted for 80% of all global IP traffic in 2009, and will increase to 87% by 2014.

Figure 4 – Global IP Traffic Forecast Growth 2009 – 2014 [2, 3]



	2009	2010	2011	2012	2013	2014
Mobile Data	91	228	538	1158	2132	3528
Managed IP	3652	4963	6771	8851	11078	13199
Internet	10942	15205	21181	28232	36709	47176

Source: Cisco Visual Networking Index, Forecast and Methodology 2009-2014

As these data volumes increase, it is apparent that the average value of an individual usage transaction is approaching zero. Yet, for all CSPs, offsetting collected revenue is not keeping pace with increasing costs, and the behind-the-scenes complexity to support the ever-changing layer of customer service offers is climbing to critical proportions. As the advanced services previously described gain prominence, some transactions will carry real monetary values for some global regions where regulation allows it; adding another dimension of complexity to the data management and accountability functions. The key is in collecting and accounting for all data transactions so as to provide proper service functionality and the right level of monetization.

Most installed OSS BSS are not able to address this surge in user traffic or the real-time aspects of the latest multi-supplier services, much less those that will be created and launched in the moths ahead. A change in business strategy is essential to meet the data traffic challenge in a way that will also keep customer satisfaction high and operations costs in line with expected revenues.

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[2] The category of *Mobile Data* includes mobile and internet traffic from handsets, notebook cards, and mobile broadband gateways. *Managed IP* includes corporate IP WAN traffic, IP transport of TV and VOD. *Internet Data* denotes all IP traffic that crosses an Internet backbone.

[3] Information reported in Figure 4 was obtained from the report: *"Cisco Visual Networking Index, Forecast and Methodology 2010"*. The index rests on a foundation of analyst projections for Internet users, broadband connections, video subscribers, mobile connections, and Internet application adoption. Analyst forecasts come from SNL Kagan, Ovum, Informa Telecoms & Media, Infonetics, IDC, Frost & Sullivan, Gartner, ABI, AMI, Screen Digest, Parks Associates, Yankee Group, Dell-Oro Group, Synergy, comScore, Nielsen, and others.

WHAT IT ALL MEANS

The Business Architecture for Advanced Data Mediation

The real-time, always on, and always connected world brings a common operations problem to light, especially with regard to mobile services. Collecting and processing user transaction data requires an enhanced approach to all OSS BSS functions. It includes a strategy, based on business purpose, tied to a means for collectively managing escalating traffic volumes and data relationship complexities from all of the following sources:

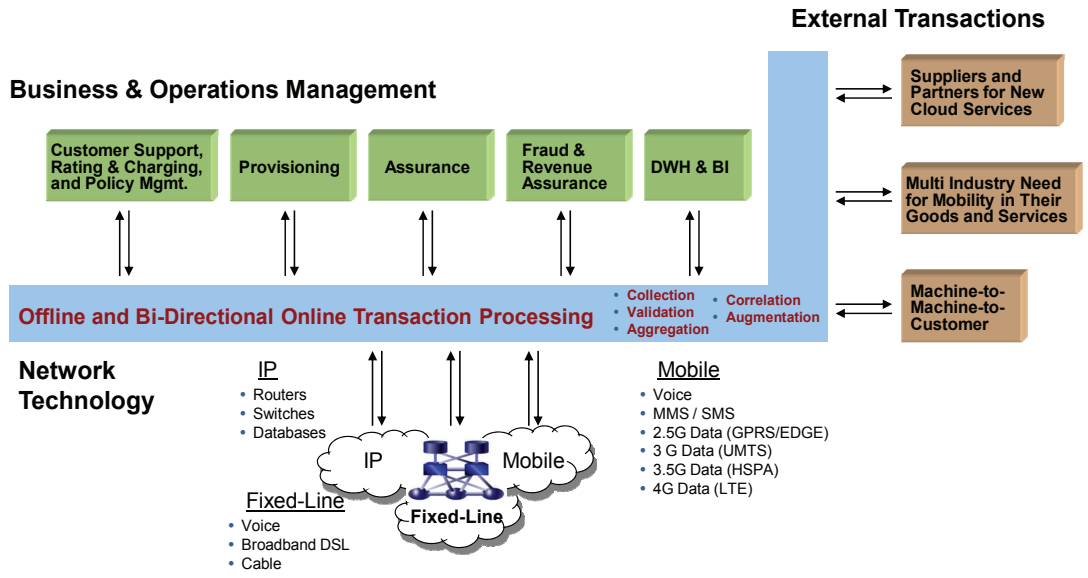
- User device advances (smartphones)
- Network technology evolution (4G – LTE)
- Consumer and business customer use of, and advancing sophistication of mobile applications (Apple App Store, Google Android, and Nokia Ovi)
- Multiple industries incorporating mobile communications into the goods and services they provide (healthcare, education, publishing, public services, transportation & logistics)
- Launch of cloud-based service offers that combine components of external partners with internal network information
- Use of machine-to-machine communication to perform various tasks with an ability to provide human notifications or decision requests as appropriate

Cost-efficiently addressing the data volume and complexity challenge should be a top priority for CSPs as it has significant impact on most OSS and BSS functions such as: real-time rating & charging, performance management, customer satisfaction management, provisioning, assurance, revenue management, partner management, and service planning. If network traffic volumes come even partially close to the projected values discussed in the previous section of this report, a business-as-usual approach to the data collection and management needs for any of the OSS BSS functions just named will not meet the business requirements that today's advanced service offers demand. Chief among these is collection and aggregation of massive data volumes when service operability is based on real-time decisioning.

To meet the needs of business head on, a data collection and management solution must now go well beyond simple billing mediation, collection and validation functions to include real-time, high throughput aggregation capabilities. As shown in Figure 5 below, it must support both offline (a.k.a. batch processing) and bi-directional online transaction processing. It must consolidate data flows by replacing duplicated systems doing the same functions for different technologies in order to reduce operating costs and, most importantly, eliminate complexity when real-time interaction with multiple data sources is of utmost necessity. In an extreme sense it must also collect, validate and aggregate network data, from a variety of technology silos, and combine it with information from external sources to satisfy service requirements; be it from content partners, industries adding mobile communications to the goods or services they provide, or M2M communication. Finally, many service offers now use business policy, set by internal work teams and, in some cases, through direct customer interaction, to manage service

behavior. Such functions are dependent on modern transaction processing systems to apply business rules to the multi-faceted flow of data from internal systems, network technology and external sources.

Figure 5 – Offline and Bi-Directional Online Transaction Processing



Source: Stratecast

Stratecast believes that business success for any organization within the converging communications industry will be strictly dependent on its ability to collect, validate, aggregate and process transaction data from multiple sources. This will often occur in a near real-time setting as technology and business operations become more complex. It is the key by which the growing transaction volume beast can be controlled in a most cost-effective, business practical and customer satisfactory manner.

Key Requirements for a New Kind of Data Management Tool

The role of any mediation system today has moved from simple data collection, validation, consolidation and protocol conversion for support of the billing process, to advanced bi-directional communication involving policy-defined business and/or customer actions. The key requirements for a consolidated "horizontal mediation" solution should include:

- ***Scalability*** – Efficiently address a wide range of transaction volumes as CSP business opportunities evolve, customers increase and as technology evolution creates higher data volumes. The system should flexibly upsize its transaction processing capacity without major downtime for hardware change outs or software upgrades. It should keep pace with rising traffic volumes and real-time transaction processing needs without impacting throughput rates, which could climb to several hundred thousand transactions per second based on certain business drivers often tied to user device technology and network infrastructure updates. It should also support data flows from other mediation systems in a step-wise fashion to reduce complexity, improve

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accessibility by business functions beyond billing, increase accuracy and lower the total cost of operations through system consolidation.

- ***Flexible Data Format Handling*** – Support all network and data management protocols, not just IP. This is critical, as TDM-based voice services will continue, and required partner database interactions may follow less than current web-based design standards.Real-time rating & charging plans, along with provisioning and assurance functions will continue to utilize data from multiple sources, hence the need for mediated data access. In such cases, the transactions from each source need to be aggregated and correlated according to service definition and other BSS OSS operating requirements.
- ***Availability*** – A data collection and aggregation platform must support "5 9's" availability, consistent with any "carrier grade" network element. This includes all scheduled maintenance windows, and unplanned downtime. It may mean the platform must operate in high-availability "hot standby" mode or use other cost-efficient means to reach this objective.
- ***Unified Convergent Architecture*** – The platform should be common, with no customer-specific plug-ins, core product add-ons or customer extensions, to deliver the right level of functionality at the most reasonable cost. It should also be flexible to accommodate change while supporting any data stream from any source. By so doing it will reduce complexity, improve overall cost of operations and accommodate change whenever business needs evolve.
- ***Simplicity of Operations and Time-to-Market*** – The platform must accept business process and service operations rules based on input from business analysts rather than IT specialists. This improves time to market by eliminating long lead times for technical customizations. It is also essential for addressing service needs when "rapid time-to-completion with minimal cost" requirements are a regular occurrence.
- ***Aggregation and Session Management*** – Bring together data from any source—a network technology silo, internal database or external partner source—with any other source in a standardized flow. This ensures repeatability of business results, minimizes errors from manual work efforts, and sustains the delivery of near real-time data management functionality as business needs dictate.
- ***Real Time Correlation and Filtering*** – As network technology advances and user devices evolve, the system must support real-time service requirements by collecting usage transactions from multiple sources, including network nodes and IT databases. It must also aggregate the data, when necessary; correlate, and then filter around the customer or other business parameters, as required. When conditions change, business rules defining the data collection and processing function should be reconfigurable in hours or days according to the level of complexity involved.
- ***Sensitivity to Total Cost of Ownership*** – Lower cost of implementation through avoidance of 3rd party software platforms embedded within the mediation software architecture. Take advantage of standard hardware instead of depending on specialized high-capacity hardware. Enable business analysts to define data analysis plans and service definitions.

- ***Openness*** – New functions and interfaces can be developed independently of the vendor's service organization to address evolving business needs. With transaction volumes increasing in multiple dimensions, real-time aggregation and correlation are essential components of effective service operability and understanding of customer behavior.

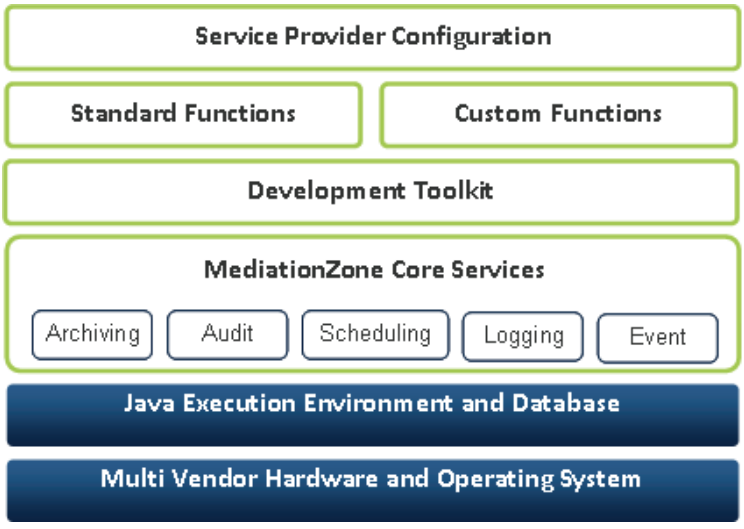
Stratecast believes these requirements, and likely others, are essential ingredients for a data collection and aggregation platform capable of meeting the business challenges of today's changing communications marketplace. Such a platform is essential for delivering long-term sustainability to any network operator's OSS and BSS environment, given the rising tide of usage transaction volumes and data management complexities.

MediationZone – How DigitalRoute Addresses the Market

A convergent offline and bi-directional online transaction processing platform is a strategic investment for all CSPs as a means for addressing rising customer traffic volumes and the complexities associated with cost-effective treatment of today's increasingly complex service offers. The DigitalRoute MediationZone horizontal mediation platform is a convergent mediation system that supports any data exchange between any number of systems, for both real-time and batch operations.

MediationZone is based on a modular architecture, where functionality and processing capacity can be added over time. It delivers an execution environment for mediation applications using standard software components. There is a separation between the runtime platform, off-the-shelf functionality and configuration, as shown in Figure 6 below. This enables independent evolution of computing infrastructure, standard software and customer configuration as requirements change. In addition, MediationZone separates the concept of protocols, from physical/logical data formats and for whatever business logic is necessary for managing an information flow.

Figure 6 – MediationZone Functional Architecture

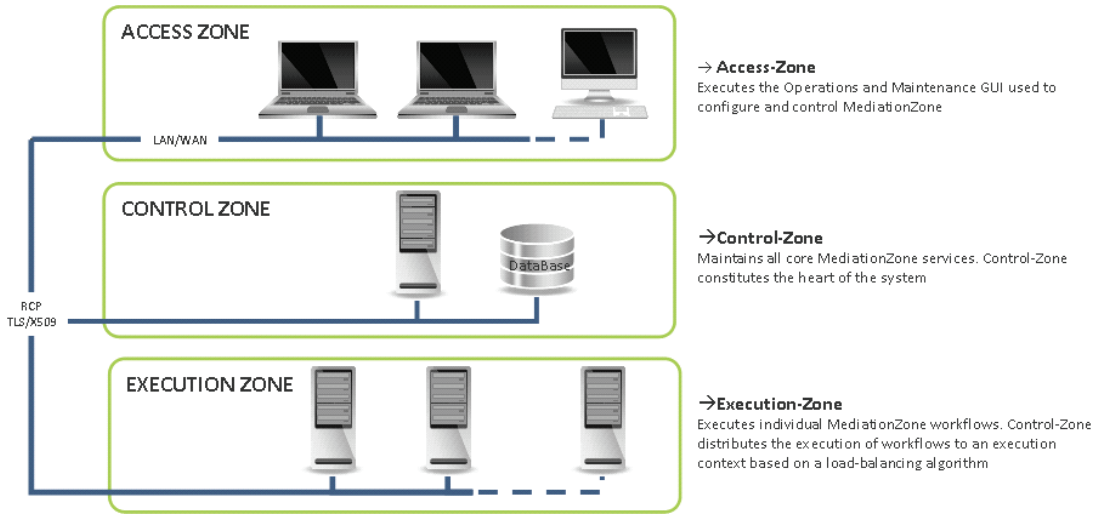


Source: DigitalRoute

Logically, MediationZone is constructed to optimize operations by separating different parts of the solution to maximize processing capacity and user control, as shown in Figure 7 below:

- ***Access Zone*** – The operations and maintenance layer, where users access the system through graphical user interfaces. It provides operations and maintenance functionality in addition to user-definable tools.
- ***Control Zone*** – The control layer, hosting the runtime control environment. This part of the product consists of several collaborating platform services and a persistent store for controlling every aspect of a distributed installation.
- ***Execution Zone*** – The processing layer delivers capacity for all workflows deployed in the system.

Figure 7 – MediationZone Logical Architecture



Source: DigitalRoute

Implementation Example – Mobistar a European Convergent Services Operator

Mobistar is a convergent services operator headquartered in Belgium, serving approximately 3.8 million subscribers in Belgium and Luxembourg. The company is a subsidiary of France Telecom's mobile division, Orange. It presently offers mobile voice and data services, fixed-line broadband and mobile TV.

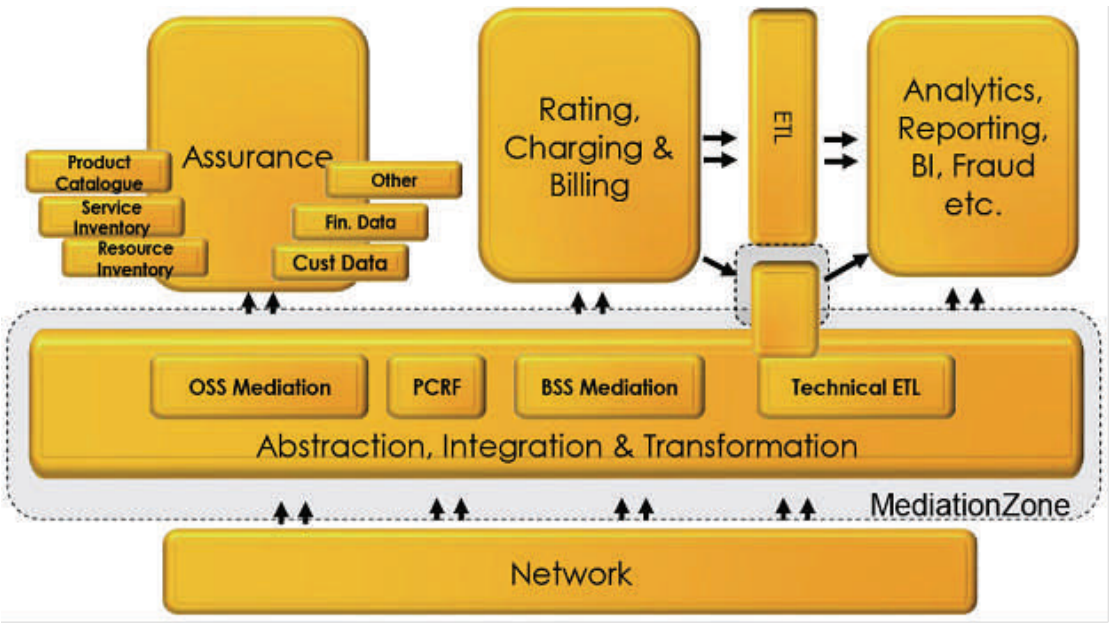
In early 2007, Mobistar determined it needed to start on a blueprint for a new IT architecture; one that did more than just reduce operating costs. The Mobistar IT landscape had been growing organically for several years and IT assets at the time had become a liability. Some legacy systems were also due for replacement. Mobistar's objective for this transformation included a need to lower the cost of operating its legacy systems and to change the overall IT cost structure. The IT environment was too rigid to meet business needs, as time-to-market to introduce new functionality generally

exceeded 9 months. IT spend at this time was greater than 5% of gross revenue, so a target was set to reduce this level to 3.5% using a new way to do business and support customers.

The transformation process focused on driving simplicity, with an IT mantra to stay within the box of functionality for the systems that were placed in service. In other words, configure off-the-shelf (OTS) systems but do not develop work arounds outside those systems to meet business directives. The target architecture was one of simplification and rationalization through industry standards and best practices. MediationZone was selected as one of those software products that met the flexibility and "business support without a lot of IT focus" requirements.

The rationale for selecting MediationZone was twofold. First, it offers Mobistar a framework to handle its active and passive billing mediation requirements. For example, MediationZone provides configurability instead of customizations, which brings the flexibility needed to address problems when they arise, or change in business focus when it occurs. Such change is accommodated within a few hours or days, instead of weeks or months as was the case previously. Second, DigitalRoute's long-term vision is tied around horizontal mediation, which allows for data integration between any system or network node. This means that Mobistar could use the same platform to satisfy its BSS, OSS, ETL and PCRF requirements, as shown in Figure 8.

Figure 8 – Mobistar Network and IT Vision



Source: Mobistar

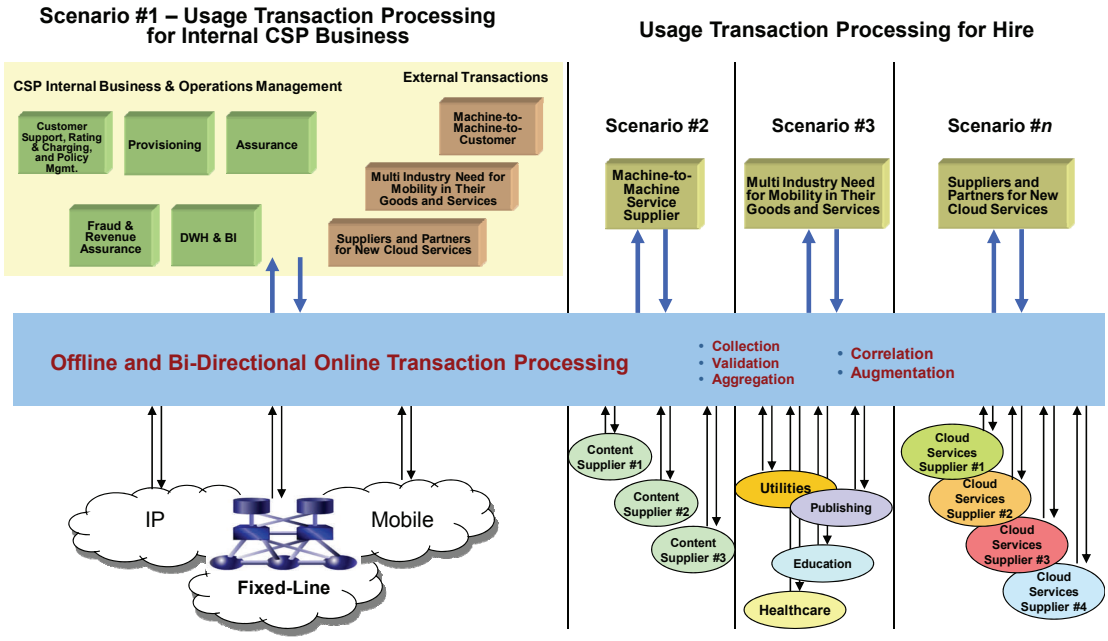
One significant surprise was the ease of use and level of technical expertise required to configure the platform. Although skilled mediation people defined on-line work flows, they worked to establish business rules within the platform's graphical environment. Business analysts were able to create Extract Transform and Load (ETL) configurations without help from more technical IT specialists. This solution approach met Mobistar's quest for simplification by allowing IT and network to evolve independently.

Mobistar firmly believes that billing systems will become simpler with more transaction logic evolving towards the mediation layer. The mediation layer will also play a long-term strategic role in aggregating the amount of information going to other BSS, OSS and ETL functions as network technology evolution adds complexity, and customer data usage expands.

A New Business Opportunity – Mediation for Hire

In a previous section of this report, the ability for CSPs to collect and process usage transactions from a growing list of sources, internal and external to the organization, was deemed "essential for long-term business success". The left side of Figure 9 below indicates that a flexible mediation solution is the most important first step in any data mediation and usage processing strategy.

Figure 9
Mediation for Hire to Support Partners and Other Industry Needs



Source: Stratecast

Complex services involving a network connection for a business customer or consumer, and external capabilities riding the network, present CSPs with an added opportunity, as depicted on the right side of Figure 9. For example, in scenario #2, a CSP's transaction processing platform could be used to aggregate data from various content sources for a solution supplier that, in turn, would either use the information internally or enrich it with additional data before offering it to others, depending on the business problem at hand. Such an arrangement could have bearing on multiple layers of machine-to-machine interactions for remote supply chain monitoring and fulfillment or for the use of "prearranged service components", as part of an enriched service offer. Scenario #3 demonstrates the collection of customer usage data from different sources for aggregation by customer and delivery to a "utility payments operator". Other scenarios involving suppliers within healthcare, education, publishing, public services, manufacturing,

Scenarios involving suppliers within healthcare, education, publishing, public services, manufacturing, retail services, and similar industries could each benefit from such data collection and processing services. These services could be offered in various business model formats according to industry need and acceptance.

retail services, and similar industries could each benefit from such data collection and processing services. These services could be offered in various business model formats according to industry need and acceptance.

Stratecast believes that transaction volumes will continue to increase for nearly every industry today. Collection, validation, aggregation and correlation of many types of data into usable events is a long-term business opportunity for a CSP that can demonstrate its proficiency in the management of any type of data from any source; often in a near real-time setting. These capabilities would be offered through a Software as a Service (SaaS) business model.

Stratecast

The Last Word

The telecommunications industry has experienced metamorphic change over the past 25 years. Today's mobility services have gained customer acceptance and widespread use in ways that could never have been imagined back then. Much of these customer service advances are possible because of the evolution of user devices with touch screen capabilities and networks with always on broadband availability. In less than four years, this combination of market drivers has produced a new multi-billion dollar mobile applications market defined by the likes of Apple, Google, and Nokia. Network technology advances have also made the "taken for granted" mobile broadband connection possible with 3G, 3.5G and now 4G mobile networks becoming commonplace; this, in addition to the proliferation of Wi-Fi and WiMAX connectivity.

With all of the customer attention around faster download speeds, billing for mobile data quickly moved to flat rate plans; following the pattern set previously by fixed-line broadband. CSPs are now enticing customers to move from such plans to "measured and metered" ones, as data traffic volumes far outpace corresponding levels of revenue needed to offset the costs of providing network capacity. Regardless of who wins the war between customers wanting as much capacity and capability for the lowest price and CSPs that must effectively manage costs against revenue to produce shareholder value, technology advances (networks, user devices, applications, partner collaboration) continue to produce higher levels of user traffic volume. With such volume increases, many OSS and BSS are not able to effectively address the business needs that go along with an always connected, real-time converged technology environment.

Mediation systems, designed to address the real-time and now bi-directional flow of transactions from multiple technology silos, find an increasing play in reducing some of the operations costs and support needs of new services and business models. Central to such systems is on-line, high throughput aggregation functionality, especially as certain network nodes and databases generate high quantities of low-value detail that must be consolidated before being effectively processed by many installed OSS and BSS. This is important for not only rating & charging systems but also others associated with partner management, assurance, provisioning, fraud management, revenue assurance, and customer-centric real-time analytics. Consolidation of older technology or protocol specific mediation systems is of equal priority for more effective cost control.

DigitalRoute has defined a clear strategy for the transformation and optimization of usage event mediation onto a single platform for both online and offline processing. The benefits of this strategy are now enabling a flood of new business opportunities that go way beyond billing. Failing to recognize the business needs and associated benefits from a consolidated mediation strategy could be a strategic misstep that will have major repercussions in the months ahead.

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