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## Eight Billion Transactions per Day and Growing: Why Mediation is Essential for CSP Financial Success

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## Eight Billion Transactions per Day and Growing: Why Mediation is Essential for CSP Financial Success

### Introduction<sup>1</sup>

In early 1979, NTT introduced the first generation (1G) commercial mobile service in Tokyo.<sup>2</sup> This was followed by the simultaneous launch, in 1981, of the NMT 1G service in Denmark, Finland, Norway and Sweden; it was also the first mobile phone network to incorporate international roaming.<sup>3</sup> Ameritech in 1983 initiated the first commercial AMPS 1G service in Chicago.<sup>4</sup>



These technology breakthroughs were the first step in providing an improved customer experience for voice services, compared with the location-dependent restraints that fixed-line voice imposed on its users. The major capacity limitations with these early analog services, however, made mobile voice a feasible, but expensive, alternative to wireline for a relatively small number of users.

The later introduction of 2G and 3G digital technology, and now 4G, established mobile voice and data services as an affordable communications option for people in nearly every part of the world. These improvements in network technology, coupled with the evolution of user device capabilities and heavy customer use of downloadable content, have pushed network traffic and thus Communications Service Provider (CSP) business support processes and systems, to the edge of their design limits. **Exponentially rising transaction usage volumes are the culprit.**

This SPIE looks at the current growth rate in usage traffic—voice, but primarily data—and explains the significance that advanced mediation functionality plays out for most business support (BSS) and operations support systems (OSS). These include: real-time rating & charging, partner management, performance management, revenue assurance, fraud management, margin analysis, customer satisfaction management, provisioning, service assurance, and network planning. The report explains why an advanced mediation solution is essential for the communications marketplace, as new customer pricing plans are introduced and as new service options are established. Through CSP

<sup>1</sup> In preparing this report, Stratecast conducted interviews with the following:

- CSG – Jennifer Fellows, VP Product Management
- CSG – Rob Kunzler, VP Marketing
- CSG – Monica Ricci, Director Product Marketing
- CSG – Dwayne Ruffin, VP Product Strategy

Please note that the insights and opinions expressed in this assessment are those of Stratecast and have been developed through the Stratecast research and analysis process. These expressed insights and opinions do not necessarily reflect the views of the company executives interviewed.

<sup>2</sup> NTT developed three competing standards, but later abandoned them in favor of 2G, 3G and 4G digital technologies.

<sup>3</sup> The Nordic Mobile Telephone (NMT) service was first used in Sweden, Finland, Denmark, Norway, Switzerland, Netherlands, Eastern Europe, and Russia. It was later abandoned in favor of GSM 2G, 3G and 4G digital technologies.

<sup>4</sup> Advanced Mobile Phone System (AMPS) was defined by Bell Labs in 1978 and deployed in North America, Australia and Israel. It was later abandoned in favor of GSM and CDMA 2G, 3G and 4G digital technologies.

solution implementation examples, the report also shows how one mediation supplier—CSG International—is creating value and opportunity for its CSP customers throughout the world. For example, CSG explained to Stratecast how one solution addresses the needs of a CSP mediation customer that currently processes in excess of eight billion transactions per day. Another CSP is growing its transaction data volume at greater than a 100% compound annual growth rate (CAGR), with two billion events processed per day today, which is projected to grow to 19 billion transactions per day within three years.

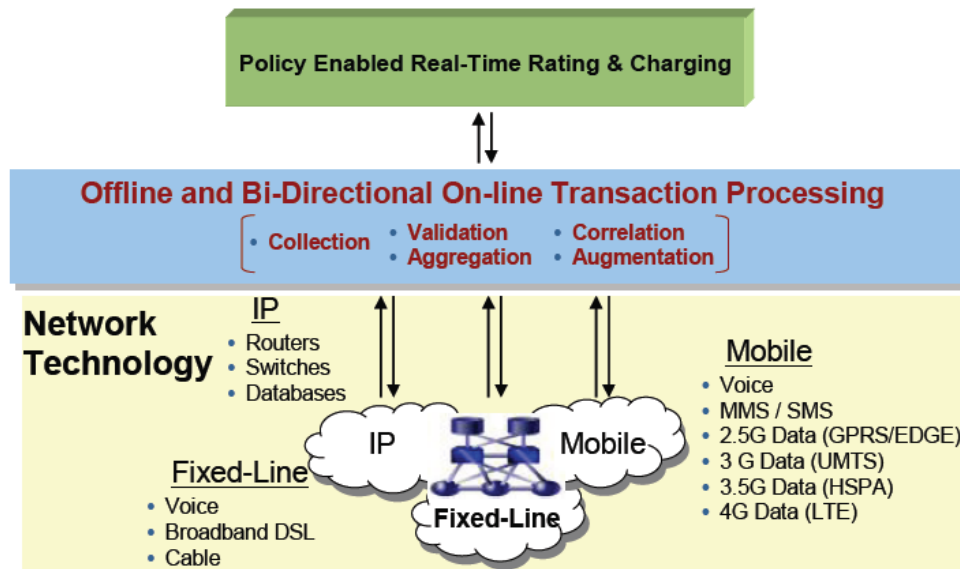
### What is Online and Off-line Mediation?

Mediation is the lynchpin for any real-time service offering strategy and the monetization of all transactions associated with such services. Transaction data comes from multiple network sources including:

- The signaling network, such as SS7 and SIP messages.
- Call and data usage detail records generated by the nodes that make up a network—generally known as “xDRs” because they are associated with data from any service. A typical node would be a fixed-line switch, mobile switching center (MSC), the gateway GPRS support node (GGSN) or packet data network gateway (PGW).
- Content data servers and data authentication servers using RADIUS and/or Diameter.
- The “packets” that constitute the services traversing an IP network.

Shown in Figure 1, support of the monetization process involves usage information from all sources, which must be collected, correlated and aggregated into a common format.

**Figure 1 – Monetization Driven Transaction Usage Processing**



Source: Stratecast

*While some CSPs have recognized the value of a single mediation system bringing together multiple data streams, many still struggle to achieve it with a solution capable of meeting the transaction levels of today, and with enough scalability to cost-effectively address the higher transaction volumes of tomorrow.*

After data collection and normalization, the mediated data is sent to a real-time rating & charging engine where business rules are applied to calculate the price of the event. In some cases a notification back to the originating network node is necessary when billing for events that exceed payment or usage balances set up by either the CSP or the customer.

The role of the mediation function has changed substantially over the past five years. As implied by Figure 1 above, processing massive usage traffic volumes in silos—an approach still employed by many CSPs—is no longer practical, cost effective or supportive of a quality customer experience. To meet network and service needs today, to align user control functions with business and network processes, and to support customer notification

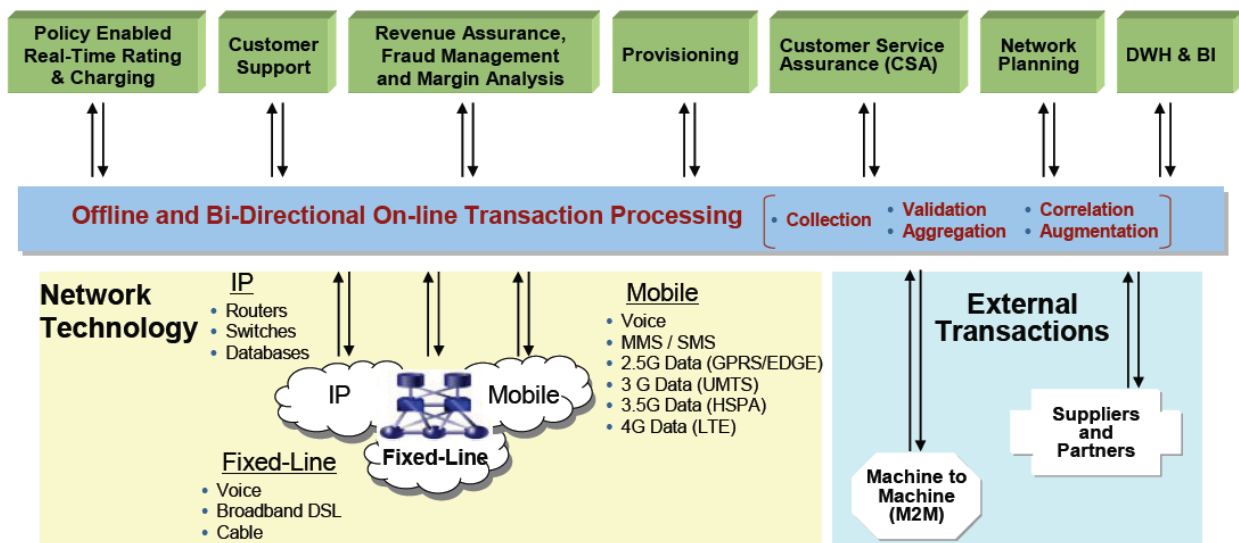
requirements, mediation systems are now engineered to engage in policy-defined bi-directional communication with any network device or business system.

### Improving Business Understanding and Network Operations

There are two ways to gain real-time insight about customer usage. For networks of mixed technologies, this comes from traffic data mediated through bi-directional interactions with the respective network nodes or external data sources, to allow or disallow certain events. For all-IP networks, this same process is accomplished through Deep Packet Capture (DPC), also known as Deep Packet Inspection (DPI) of the information that traverses the network.

Most mixed technology CSPs today employ one or more separate mediation systems to collect transaction data for billing purposes. Other functions, some of which are shown in Figure 2, require additional data collection and mediation systems designed to support each business need.

**Figure 2 – Business and Operations Management Transaction Management Support**



Source: Stratecast

All of the functions in Figure 2, and the processes they support, are complex and not optimized. New business needs have now forced the global CSP community, along with similar industries, to engage in a robust data mediation enhancement campaign to meet the needs of processing billions of usage events per day, reduce the number of systems involved, and to align processes more closely around customer activities.

DPI is a data collection function that can be used to address a variety of business and network operations needs. It uses probes placed at strategic points within a network to gather snapshots of the information essential for understanding the services customers use, by passively monitoring the stream of IP traffic traversing a fixed point within the network—typically at high-volume confluence points. Aggregated data from this procedure is fed to a policy manager, and usually integrated with a real-time rating & charging engine to enforce the right monetization action. At the same time, data can be mirrored to other systems such as revenue assurance, fraud management, network planning or customer service assurance (CSA). **The limitation of DPI-only solutions is that most CSP networks today continue to be a heterogeneous mix of modern IP and older time division multiplexing (TDM) technologies. Full support needs the help of an end-to-end mediation solution that can coordinate transaction data independent of protocol source.**

***Within the communications industry, most CSPs are deploying new mediation systems, both to support the latest network technologies and to consolidate the data collection and mediation processes that address the billing function. Once in place, other business applications of mediation follow.***

## How Big Will They Get? What are the Projected Mobile Data Volumes?

***Managing today's surge in data traffic from both fixed and mobile networks is the most significant business and technology challenge since automated systems were established more than 30 years ago. The real-time and massive scale processing aspects of the data traffic boom are challenging the design limits of most systems, in addition to core business functions tied to accountability, the monetization processes and continued customer satisfaction.***

On a global basis, mobile data traffic has more than doubled every year for the past four. It will continue to grow at a phenomenal rate for the immediate future as long as the global CSP, app development, and content creation communities deliver what customers want. This includes an always-on and always-available mobile broadband connection at a reasonable price, “cool” new user devices, more video, and a keen understanding “in customer time” of spending trends.

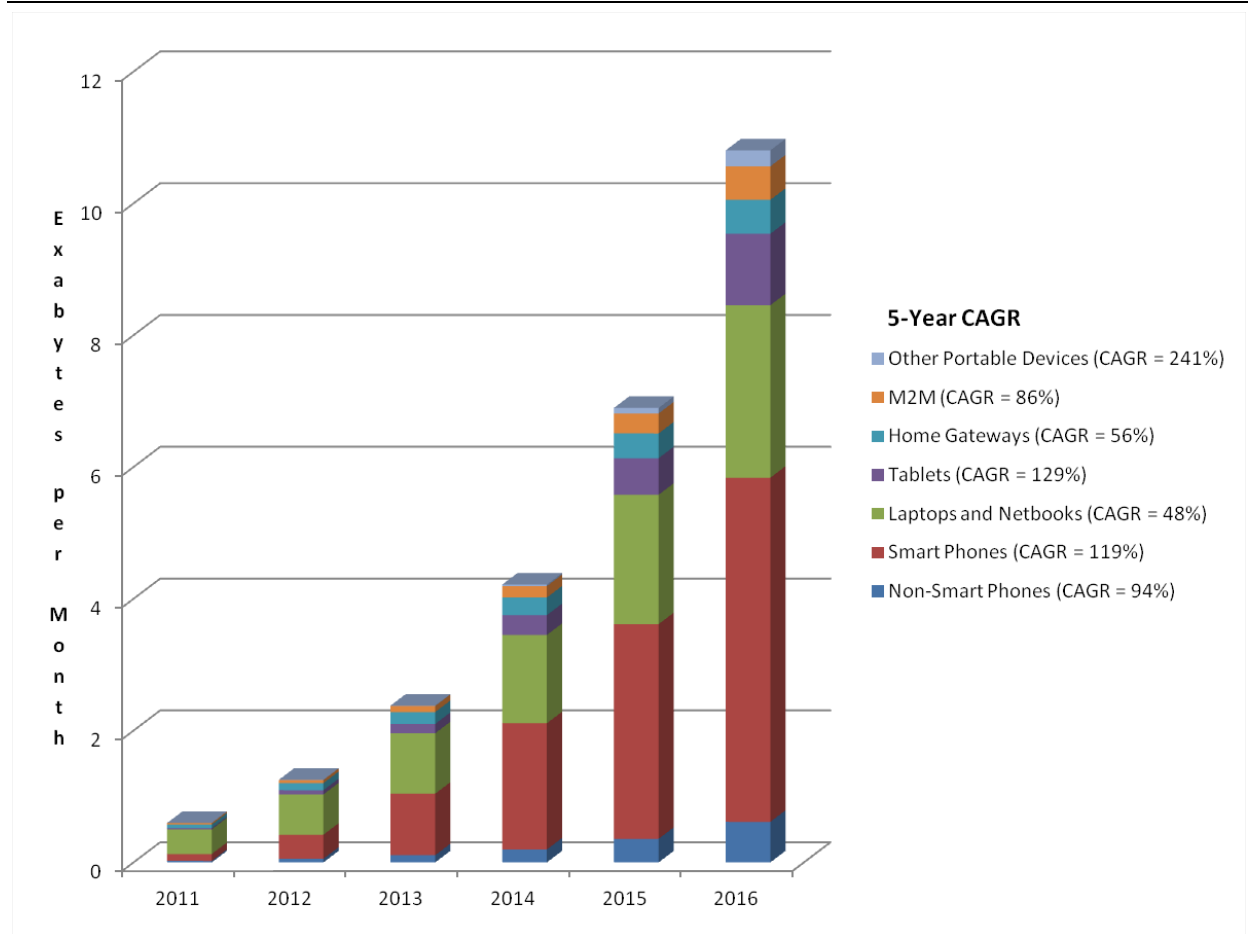
One of the most frequent questions that arises is what types of mobile technology generate the greatest usage. As Figure 3 below demonstrates, the Cisco Visual Networking Index (VNI) predicts, not surprisingly, that tablets, laptops, and smartphones account for more than 80% of total mobile usage traffic in each of the next four years.<sup>5</sup> It is fair to assume that this volume of data also represents a majority of the usage transactions to be collected and processed.

While mobile traffic growth will likely double in 2012, and again

<sup>5</sup> See Cisco report: *Cisco Visual Networking Index: Global Mobile Data Traffic Forecast Update, 2011-2016*, February 2012, p 7. The Cisco VNI, as this report is often called, is available from the public domain. It contains analysis of market forecast data based on internal Cisco information and external projections for mobile data usage combined from several organizations. They include: Informa Telecoms and Media, Strategy Analytics, Infonetics, Datamonitor, Gartner, IDC, Dell'Oro, Synergy, Nielsen, comScore, and the International Telecommunications Union (ITU).

in 2013, significant growth can also be attributed to fixed network technologies. Though not as well monetized as mobile traffic, fixed network data is still a majority.

**Figure 3 – Global Mobile Data Forecast by Device Type**



Source: Cisco Visual Networking Index: Global Mobile Data Traffic Forecast Update, 2011-2016

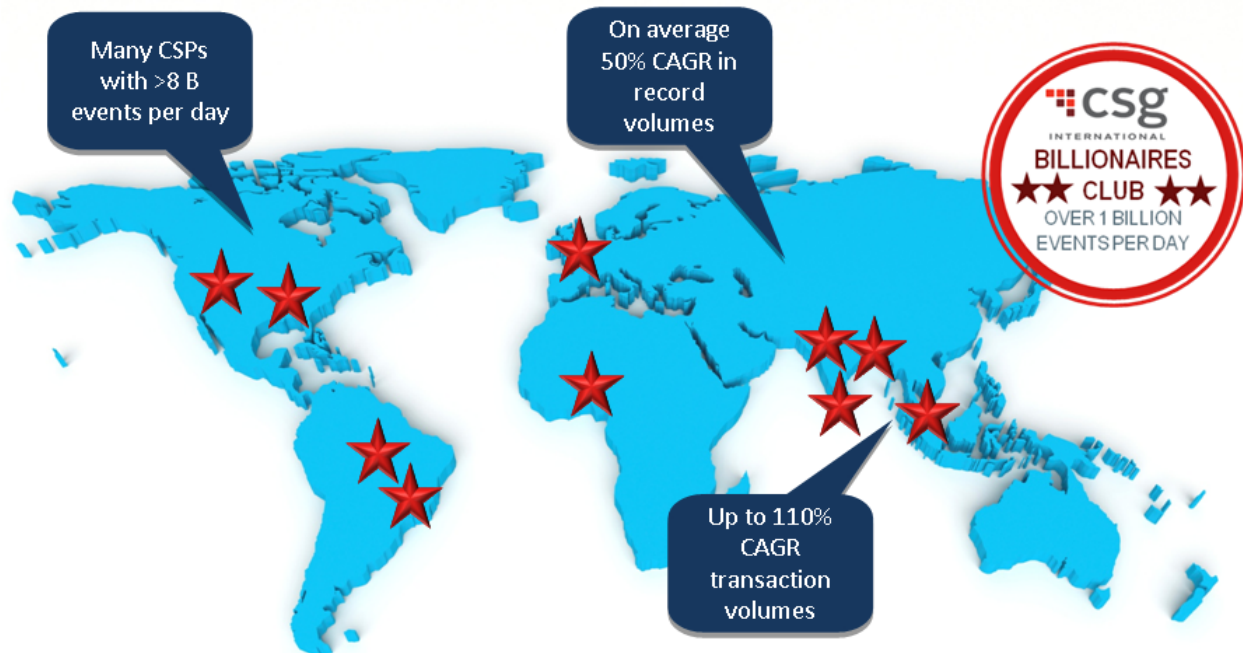
### The CSG Billionaires Club

Another perspective on the business challenge of data growth is the number of CSPs mediating in excess of one billion transactions per day. CSG International explained to Stratecast that it launched its “Billionaires Club” three years ago when its first mediation customer crossed this mark. Today, a growing number of CSG’s mediation customers are at this level, or are rapidly approaching it. For example, Figure 4 below provides a sampling of CSG CSP customers that mediate more than a billion transactions per day. The need to process such large data volumes, however, is not limited by geography or network technology. The specifics of some of these CSP’s business needs are described in a later section of this report.

**Stratecast believes the long-discussed data tsunami has arrived. CSG’s examples of its Billionaires Club are the best indicator of what will continue to be a growing challenge for CSPs, as well as enterprises in related industries such as financial services, healthcare and retailing. And this doesn’t even consider the additional boost in data volumes that will come**

from mCommerce, when customers truly embrace what this can do to make life better, be it through near field communications (NFC), proprietary partner usage agreements, or downloadable apps.

Figure 4 – CSG Sample of CSPs Processing More Than One Billion Transactions Per Day



**CSG'S 10 LARGEST CSP CUSTOMERS MEDIATE >9 TRILLION EVENTS/YEAR**

*Source: CSG International*

## Business Drivers for Data Mediation

Addressing data volume growth and complexity in a cost-efficient manner should be a top priority for CSPs. A business-as-usual approach to the data collection and management needs for any OSS BSS function will not meet the business requirements that today's advanced service offers demand.<sup>6</sup> Chief among these is the collection, aggregation and correlation of massive data volumes when service operability is based on real-time decisions. The key business drivers for advanced mediation solutions are:

- **Increased Customer Usage of Advanced User Devices** – As customer use of smartphones, tablets and laptops continues to generate data volumes much greater than traditional basic-feature mobile phones, a mediation solution must now support an exploding volume of data records per user in both off-line mode for certain transactions (a.k.a. batch processing) and as bi-directional online transactions, according to the type of services used. Cisco, for example, assessed that the typical smartphone generated 35 times

<sup>6</sup> Stratecast report OSSCS 12-09, *Global CSP Billing Part 2: Key Market Requirements Analysis*, September 2011. For more information on how to obtain these studies, or other Frost & Sullivan or Stratecast reports, contact your account executive or email [inquiries@stratecast.com](mailto:inquiries@stratecast.com)

more mobile data traffic (150 MB per month) in 2011 than a basic-feature cell phone, while tablets generated 121 times more data (517 MB per month) and laptops using a mobile data card generated 498 times more data.

In addition, smartphone usage nearly tripled in 2011 compared with 2010, and approximately 12 percent of total global handsets in use today are smartphones. However, these devices represent 82 percent of total global handset traffic.<sup>7</sup>

- **Increased Numbers of Advanced User Device Customers** – Recent Apple sales data shows that through June 2012 it sold a cumulative total of 244 million iPhones and 84 million iPads.<sup>8</sup> In addition, Apple broke its own sales record by booking two million iPhone5 units in the first 24 hours they were available.<sup>9</sup> In March 2012, some predicted that Apple would also sell 100 million iPads by the end of 2012.<sup>10</sup>

As further proof of this phenomenon, CSG explained to Stratecast that developing economies today own 4 out of 5 mobile connections, show a smartphone/tablet penetration rate of only 70 percent and are projected to grow at a 20-25 percent CAGR for the foreseeable future. People are accessing the internet from smartphones and tablets for the first time in many developing areas of the world; thus bypassing the traditional PC access route. Additionally, owning the latest device in either category has become a status symbol, so much so that people are purchasing these devices as a percent of spendable income several times that of their counterparts in more developed regions.

- **Volume of Data Generated by New Network Technologies** – Cisco notes that the rise of 4G mobile technology, which includes WiMAX and Long-Term Evolution (LTE), generates a disproportionate amount of mobile data, for two reasons. First, many of the 4G connections now in service support residential broadband routers and laptops that usually have a higher than average usage rate. Second, the higher speeds enabled by a 4G connection encourage the use of higher-bandwidth applications. This means that a 4G-connected smartphone is much more likely to generate higher traffic volumes than the same model smartphone using a 3G connection. Cisco explained that in 2011, 4G mobile connections represented only 0.2 percent of all mobile connections, yet generated approximately six percent of mobile data traffic. It projects that, by 2016, 4G will represent six percent of all mobile connections but generate 36 percent of total mobile traffic.<sup>11</sup>
- **Coordination of Usage Data from New Business Model Endeavors** – Collection, validation and aggregation of normalized network data will be essential for a long-term positive customer experience. It also goes beyond network data to include input from external sources such as content partners, industries adding mobile communications to the goods or services they provide, machine-to-machine (M2M) communication, and cloud-based services to provide federated accountability of all customer service usage critical to this experience. Data volume growth surpasses that from mere customer usage of smartphone

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<sup>7</sup> For additional insight, see Cisco report: *Cisco Visual Networking Index: Global Mobile Data Traffic Forecast Update, 2011-2016*, February 2012, p 2.

<sup>8</sup> Apple sales figures through June 2012 as reported through public sources.

<sup>9</sup> See Apple press release: *iPhone 5 Pre-Orders Top Two Million in First 24 Hours*, September 17, 2012.

<sup>10</sup> As reported in USA Today, Money Section B, March 5, 2012, p1.

<sup>11</sup> Cisco report: *Cisco Visual Networking Index: Global Mobile Data Traffic Forecast Update, 2011-2016*, February 2012, p 14.



and tablet technology. For example, the volume of transactions from M2M solutions will vary by industry and the business problem to be addressed. Most expect that M2M transactions will be of short duration; and, hence, size per transaction relatively small. However, many solutions will require the frequent transfer of information from a generating source to a common aggregation point. While each transaction may be relatively small, the volume of these that must be processed will be substantial, as M2M gains traction in the coming 12-24 months.

- Financial Pressure to Reduce Operating Costs** – Reduce operating costs by consolidating data flows from duplicated systems doing the same functions for different technologies and, most importantly, eliminating complexity when real-time interaction with multiple data sources is of utmost necessity. In an extreme sense, an advanced mediation system must collect, validate and aggregate network data, from a variety of technology silos, and combine it with information from internal systems and external sources to satisfy service requirements.

Many service offers now use business policy, set by internal work teams and, in some cases, through direct customer interaction, to manage service behavior. Many new business needs are now 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.

*Stratecast believes business success for any organization within the communications marketplace 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 means by which the growing transaction usage data problem can be addressed in a cost-effective, business-practical manner.*

## Solution Deployments: Yes the Transaction Volumes Really Are That Large!

The mediation supplier community continues to include several organizations, with some better known than others. One of these suppliers—CSG International—has been on the Stratecast Top 10 Mediation Suppliers list for the past six years.<sup>12</sup> CSG explained to Stratecast that it has delivered approximately 200 installations of its mediation solutions. These are in production today for primarily CSPs, but also players in the financial services, logistics, and government sectors.

While beyond the scope of this report to describe the interworking details of each of its customer installation projects, CSG provided three detailed mediation use case scenarios that are worth mentioning. They are:

- Reduction of Lost Revenue Potential** – A large mobile operator in Asia Pacific was not only losing revenue due to outages from its Online Charging System (OCS), but identified the need to replace aging mediation systems with more robust capabilities to support future business models. Phase I of the CSG project immediately processed approximately three billion events per day, where the mediation system would first collect and then stream back any missed transactions to the OCS for any period it was down. The CSG mediation

<sup>12</sup> See Stratecast reports: OSSCS 7-8 *Billing Mediation Sector Assessment*, December 2006; OSSCS 10-07 *Global CSP Billing Part 3: Mediation Sector Assessment*, July 2009; OSSCS 12-11 *Global CSP Billing Part 3: Mediation Market Forecast and Supplier Assessment*, October 2011.

solution also consolidated several previously installed mediation systems as a second phase, which amounted to another four billion events per day. **When this multi-phase project completes within the next year, it will handle in excess of 10 billion events per day, with projections of growth to 19 billion events per day within three years.**

- **Cloud Services Mediation** – A multi-national CSP specializing in the delivery of network connectivity services to large corporate customers, governments, other carriers, and resellers needed a mediation solution to support its cloud service offerings. These services consist of a multi-tenant infrastructure as a service (IaaS) resource that allows customers to purchase and use storage or computing power in an on demand environment. The CSG mediation solution captures information for different customers and products (storage events, templates, backups, and usage snapshots) on a real-time basis. **While these transaction volumes are not significant compared to others in CSG's Billionaires Club, CSG's mediation solution addressed the new requirements for this carrier's IaaS offerings on previously installed hardware and software and, once operational, did it without adding additional support staff.**
- **Customer Volume and Smartphone Usage Growth** – A mobile operator in Latin America continues to experience rapid growth in the number of customers purchasing smartphone and tablet devices. This comes from a robust economic environment and pent-up customer demand. With the increase in advanced user device customers, this mobile operator has seen exponential growth in data volumes generated per user, on both its 3G and 4G networks. **The CSG mediation solution presently addresses in excess of eight billion mediation events per day, which are expected to further increase in the months ahead.**

## Stratecast The Last Word

Service offers for both business customers and consumers are getting more complex. This is due to continued advances in network technology, user device evolution, changing regulation, social networking, and convergence of communications services with other industries, especially IT computing, media and advertising. The business and operations requirements of these services place a greater need for mediation capabilities that can bring together usage data records from multiple sources, following various protocols. Real-time customer expectations place this function, along with real-time rating & charging, at the forefront of effective long-term customer satisfaction.

A by-product of these services is a dramatic increase in subscriber usage volumes, especially for any mobile CSP that supports the latest generation of smartphones and tablets. While flat-rate billing may still be an appropriate option for some CSPs and some subscribers, it is becoming an archaic strategy. However, counting each byte of data uploaded or downloaded is essential for determining and then offering the right service plans for the right customer needs. In many cases, advanced knowledge of customer usage has actually led to more simplistic plans, to hide complexity and to encourage customers to try out new data-intensive services. In addition, measuring usage against a plan limit is now an essential requirement for customers that purchase any type of mobile data offer.

Eighteen months ago, CSG explained to Stratecast that some of its customers were processing approximately three billion events per day. As described in this report, in excess of 10 billion per day is the new norm, with 20 billion events per day the next milestone.

We are moving into an era where CSP business models are much more individualized based on customer preference, geographical uniqueness and management focus. The follow-me models of the past are proving to be invalid in the race to satisfy today's business challenges. Mediation solutions, such as those supplied by CSG, are a prime example of how effective usage transaction management can impact the way an operator addresses the needs of its customers, or how aggressively it reaches out for new ones in the hunt to increase revenue and improve profitability.

Stratecast believes the way to an effective business environment is directly proportional to a CSP's use of proven mediation solutions designed for flexibility in supporting generations of installed network technology, and for scalability to address the challenge of exponential growth in usage traffic volume. The real-time monetization processes are counting on it.

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