Taming the Telecommunications Data Tidal Wave

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Industry experts have predicted the expansion of data in today’s information technology environment for years. According to IDC, a leading industry research firm, in 2010:

“…the amount of data created worldwide will total 1.2 million petabytes or 1.2 zettabytes… That total will increase 44 times over from 2009 to 2020”¹

In the telecommunications industry, data expansion has been not just discussed and predicted, but has been evident for the past three to five years. This fundamental change in the data loads that service provider networks are expected to provide presents an almost daily challenge for:

- Telcos that provide voice, DSL and fiber-to-the-home (FTTH) solutions like IPTV
- Cablecos that provide traditional video and ISP services in addition to voice
- Mobilecos that provide voice, messaging and mobile data services to smartphones, tablets and laptops


www.sybase.com/telecommunications
The tidal wave of data expansion has been created by what some might call a virtuous circle: Business and retail consumers discover new uses for a service provider’s connectivity. Organizations internal and external to a service provider create new applications to take advantage of the new-found audience. It is this circle of discovery and creation that has driven the expansion of data over telecommunications service provider networks from voice services to the level of network use and the associated traffic and customer information currently inundating service providers.

The seismic event driving these new growth activities is the expanded real-time use of service providers’ networks. Always-on streaming for applications and content is replacing download and playback usage patterns. Farhad Manjoo of Slate.com describes the situation:

“Every year… we’re using more of our bandwidth to download stuff we need right now, and less for stuff we need later.”

Both business and retail connectivity consumers have adopted new usage habits that reflect the new range of streaming capabilities in devices and networks available to them. These usage habits include:

- **Business**
  - Telepresence applications that include video conferences and virtual white boarding
  - Remote staff customer care and sales/marketing applications
  - Video-based training and collaboration

- **Retail**
  - Internet-enabled HD devices like Blu-ray players and TV displays
  - Game systems like World of Warcraft that allow massively parallel experiences
  - eBooks and personal tablets that provide remote reading and video consumption

These new habits are not simply serial, but layered. The new class of connectivity consumer layers their experiences in terms of concurrent usage and usage of multiple devices. It is the combination of new habits and layering that are driving hefty increases in network and customer data that are available to and that overwhelm service providers.

**Rise of Video Content**

Any exploration of the data expansion for service providers requires a look at the changing landscape of content consumption. The usage expansion of a connectivity consumer is not coming one email or webpage or tweet at time. It is coming in large chunks as 60-minute conference calls between teams of 10–20, 30 minute primetime television shows time-shifted, or social media promoted video streaming downloads. This dramatic rise in the adoption of video content means that many connectivity consumers use more information or content than they did before. In a recent study of network consumption, Cisco stated:

“Voice and video communications traffic is now six times higher than data communications traffic (email, instant messaging, and instant messaging file transfer). Voice and video communications traffic (such as voice over IP [VoIP] and voice and video over instant messaging) has reached 2 percent of all traffic, up from less than 1 percent last year.”

Despite this 100–600% increase in network consumption, it does not take more time for the connectivity consumer to take in. Instead, consumers layer content experiences on top of one other. For example, recent developments in video consumption show that these users can squeeze 12 hours of media exposure into a nine-hour window by layering their usage of content.

Connectivity consumers are not merely watching subscription content from a service provider or OTT video from an independent provider like Netflix or Hulu; they are watching HD video content on an HD display AND simultaneously using personal tablets to research or explore additional aspects of their content experience. For example, during a movie, viewers may research the book on which the movie is based. During business meetings

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or presentations, participants often review additional documentation or communicate offline with co-workers. During sporting events, fans may check statistics or fantasy league standings to augment their experience.

At this point, the connectivity consumer has not simply used the 3–4GB of data associated with the two hours of HD video content. This user is laying one on top of another to increase the over-network usage to expand his experience.

Below is a look at what a typical connectivity consumer might use per day in 2005 compared what he or she might use during a four hour time frame on a typical weekday while catching up on work or studying:

<table>
<thead>
<tr>
<th>Daily</th>
<th>Prime-time (6pm-10pm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>2010</td>
</tr>
<tr>
<td>YouTube</td>
<td>850 MB</td>
</tr>
<tr>
<td>Email</td>
<td>45 MB</td>
</tr>
<tr>
<td>Social Network</td>
<td>1 MB</td>
</tr>
</tbody>
</table>

0.88 GB | 3.18 GB

**New Devices — Many Devices**

A situation is being encountered on the mobile networks of service providers that is comparable to the video experience for broadband and enterprise grade circuit connectivity. In a mobileco scenario, the overall data loads are less pronounced from a data throughput perspective due to the form factor of the devices and the content. Nevertheless, the appetites of connectivity consumers are no less voracious.

Currently the mobile connectivity consumer’s experience has lower throughput demands than its broadband counterpart. Yet, mobile connectivity consumption has the downside of relatively new and immature device and application development environments. This fact was apparent when AT&T and Apple first introduced the iPhone on the AT&T mobile data network. While Apple did its best to safeguard the AT&T network from overuse, connectivity consumers began using the iPhone in relatively unpredictable ways. These new usage patterns were magnified by the always-on design techniques used by iPhone application developers.

To understand the intricacies of mobile connectivity consumption, imagine a common business professional’s or student’s experience at a remote location like an airport lounge or a university library. This consumer has a mobile data connection point or a mobile hotspot connected directly with or tethering to the following devices:

- Laptop for content creation
  - Work reports, term papers
- Personal tablet device for content consumption
  - eBooks and/or audio entertainment
- Smartphone for interaction:
  - Social networking and voice as either Skype or traditional mobile voice

Each of these devices uses approximately the same level of mobile usage as a smartphone. However, since they are multiplied under the concept of mobile-to-mobile (M2M) communications via the mobile hotspot, the demands of the mobileco connectivity consumer have snowballed:

<table>
<thead>
<tr>
<th>2005</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internet Radio</td>
<td>Video/Radio</td>
</tr>
<tr>
<td>0 MB</td>
<td>60 MB</td>
</tr>
<tr>
<td>Email</td>
<td>Email</td>
</tr>
<tr>
<td>5 MB</td>
<td>10 MB</td>
</tr>
<tr>
<td>Social Network</td>
<td>Social</td>
</tr>
<tr>
<td>1 MB</td>
<td>10 MB</td>
</tr>
<tr>
<td>6 MB</td>
<td>80 MB</td>
</tr>
<tr>
<td>Single device</td>
<td>Multiple devices</td>
</tr>
<tr>
<td>1 x</td>
<td>3 x</td>
</tr>
<tr>
<td>Total</td>
<td>Total</td>
</tr>
<tr>
<td>6 MB</td>
<td>240 MB</td>
</tr>
</tbody>
</table>
In the area of mobilecos, it is worth noting that the overall trend does not predict that mobile networks will continue to trail their broadband counterparts within the service provider environment. According to Morgan Stanley Research, in 2015 mobile users and their associated bandwidth will match broadband users and bandwidth for their impact on service provider networks.5

Moving from Network Focused to Customer Centric

The increased usage examples above demonstrate the size of the data tidal wave that is overwhelming service providers from a network perspective. Inherent in the increase of the number of network consumption events and sub-atomic segments (i.e., packets) is an associated increase in the amount of customer information available to a service provider. Service providers can associate customer information across many different dimensions:

- Network traffic to customer accounts to identify high usage customers
- Product traffic to customer demographics for product adoption analysis
- Customer order information to product usage for cost analysis
- Customer billing information to network traffic for margin analysis

Service providers need to seize the opportunity to not only cope with the tidal wave of data in telecommunications; they need to take the next step in managing and utilizing the information within that data to develop competitive advantage. The ability to analyze connectivity consumer behavior can enable a competitive advantage in terms of customer care/experience and new product and partnership revenue streams. And it is the development of this core competitive advantage of data analysis that prevents service providers from becoming a dumb pipe, allowing them to be a value-add partner for consumers.

There are two domains of analysis for this information:

- Real-time analysis of network usage and actions that can or should be taken
- Complex analysis of network usage in the context of the wider service provider business model

Each domain has its own opportunities and challenges.

Analyzing the Data Expansion in Real-time

For service providers, two key issues are associated with the data expansion:

- How do service providers manage their costs associated with the expansion in data usage?
- How do service providers augment their revenues associated with this expansion?

Managing the Costs of Network Operations

A recent report puts the importance of managing data usage expansion costs in proper perspective:

“…carriers such as AT&T (T) and Comcast (CMCSA) will see Internet revenues grow by 5 percent a year through 2020. Meanwhile, traffic will surge by 27 percent annually, and carriers will need to increase their investments by 20 percent a year to keep up with demand. By this math, the carriers’ business models break down in 2014, when the total investment needed exceeds revenue growth.”6

The costs mentioned above specifically relate to strategic capital expenditures (capex) costs. However, operational network costs associated with increases in network data fall into several additional categories:

- Service level agreement (SLA) violations with business and retail customers, and
- Customer service complaints associated with either partial network failure or complete network failure

The best way to avoid these costs associated with managing the data usage expansion is to have the ability to properly allocate network resources to the proper areas of the network. Efficient and effective allocation of the network can be accomplished by via real-time analysis of the service provider network. This analysis must

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6 Peter Burrows, “Will Netflix Kill the Internet?”, Businessweek, December 2, 2010, [http://www.businessweek.com/print/magazine/content/10_50/b4207043617708.htm](http://www.businessweek.com/print/magazine/content/10_50/b4207043617708.htm)
go beyond the simple and traditional analysis of transaction records (xDRs). It must be conducted at a much
deeper level to effectively manage the health, or quality, of the network.

In the case of increased video content consumption during primetime hours — using a tactical focus, network
operations teams might be able to identify the load on the network at a particular point in time. However, from
a strategic viewpoint, identification of the start of a flood of new HD content sessions for newly-available video
or associated high-demand content on the service provider’s IPTV network will require action in the next 3–5 hours
to augment network capacity to support both the external OTT content and the internal IPTV content traffic.

Mobilecos must have the ability to support the proper operation of their network. As broadband/enterprise grade
circuit and mobile networks are closely linked, mobilecos need the ability to provide efficient network management
in the event that one or more parts of the mobile network suffer from poor performance. Again, the key is to use
sub-atomic transaction or packet information to not only understand the current state of the network, but to project
the state of the network in the next 3–5 hours.

**Identifying New Areas of Revenue**

With declining revenues from core products like voice and messaging, it is critical for service providers to
understand how to develop new areas of revenue. These new revenue streams can either be augmented by or
completely based upon information from the tidal wave of data. This comes from the fact that often times the
levels of information resident in a service provider’s network constitute a unique opportunity. Telecoms, cablecos,
and mobilecos have information that other organizations simply do not have access to. This is due to the fall
of the web browser and the rise of the application market both on mobile networks via smartphone platforms
like iPhone and Android, and now broadband networks via iOS and Android for tablets. Chris Anderson, Wired
Magazine’s Editor in chief, describes this change as:

“…it’s a world Google can’t crawl, one where HTML doesn’t rule. And it’s the world that consumers are increas-
ingly choosing, not because they’re rejecting the idea of the Web but because these dedicated platforms often
just work better or fit better into their lives…”

In this environment, service providers are uniquely positioned to have access to connectivity consumer data.
In addition, service providers have tacit, if not explicit, approval to use that information. Services like targeted
marketing are based not only on the large-grained information of demographics, but more importantly on the
fine-grained behaviors observed from events, and often predicted by sub-atomic packet information, within a
service provider’s environment. In an era where connectivity consumers are trending away from usage habits
friendly to the measurement and tracking techniques pioneered by Google and others, service providers can
derive value-add information from this data.

Principally, service providers can use this information to facilitate improvement and competitive advantage with
their own products and customer relationships. At the core of this capability is the ability to quickly and accurately
evaluate the service provider’s product offerings. For example, many times product management and marketing
groups look at the demographics of the adopters of a product or service as the following chart depicts:

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<table>
<thead>
<tr>
<th>Innovators</th>
<th>Change Agents</th>
<th>Pragmatists</th>
<th>Skeptics</th>
<th>Traditionalists</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.5%</td>
<td>13.5%</td>
<td>34%</td>
<td>34%</td>
<td>16%</td>
</tr>
</tbody>
</table>
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What product teams often fail to take into account, and have the most difficulty projecting accurately, are the usage patterns of early adopters and change agents. Specifically, it is difficult to predict how those usage habits impact a service provider’s ecosystem. From the provisioning of services or distribution of equipment to the loads on a service provider’s network to social media feedback/commentary; it is difficult to understand how those initial product users will positively or negatively impact a provider. An excellent example of inability to judge the impact of service on a provider is the effect on AOL’s network and customer service infrastructure in 1996 as part of the introduction of $19.99 all-you-can-eat internet access.

The ability to improve current monitoring and future projection models is the foundation of the competitive advantage that service providers can use against their competitors. Service providers can look at not only network traffic, but at the number and type of customers to accurately predict this flood of information both at the event level and sub-atomic level, determining their most impactful customers (in both positive and negative directions).

### New Revenues

Another way to look at linking the flood of customer data with network data is to allow third parties access to anonymized detail or disambiguated aggregated datasets. In this case the service provider assumes the role of a data wholesaler for either a third party to analyze the data or take action on the data. Currently the most talked-about revenue stream resulting from allowing third parties to take action on a service provider’s information is targeted advertising. Knowing what a connectivity consumer is doing with his telecommunications experience or having a snapshot of his telecom behaviors allows a telecom to generate revenue from the data challenges within its environment. For example:

- A customer who watches OTT videos via PC is a target for an internet enabled Blu-ray player and large screen HD display as a cross-sell to his current habits
- A customer who listens to Internet radio is a candidate for cross-sell for a high-end music system
- An avid video gamer may be interested in additional gaming titles or in gaming accessories as a cross-sell

When a service provider is able to link customer behaviors, campaign specialists can use the increased level of analysis to reduce the time to market for key market trends.

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9 “They asked me to provide a Pareto chart, now what?” Business Tools Blog, http://businessstoolsblog.com/2008/05/they-asked-me-to-provide-a-pareto-chart-now-what/
Both real-time customer-centric product monitoring and targeted marketing analysis models are beyond what may have been within the capabilities of past service provider organizations. They are the types of internal and external value-add analytics that innovative service providers must cultivate to establish and maintain competitive advantage over and above the current system of focusing on demographics.

**Breadth as well as Depth of Analysis**

Another more complex level of analysis of service provider data is the ability of network operations teams (the business and operational teams downstream from the network layer) to identify how the products and services transiting a service provider’s networks are being utilized, and to determine if the usage requires additional action. This analysis requires not only usage of the big-data sets coming from network usage and customer information, but requires the introduction of disparate data sets from:

- **Customer Relationship Management (CRM)**
  - Accounts Detail and Demographics
  - Orders
  - Customer Care
- **Fulfillment**
  - Provisioning
  - Shipment
  - Inventory
- **Billing**
  - Account Features
  - Account Balance
  - Payment Information

The tremendous value in cost reduction and increased revenues justifies the linking of these disparate data sets and the processing power required to make the analysis possible at both operational and tactical levels.

**Reducing Costs: Subscription Fraud**

The area of fraud — in particular, the activities associated with subscription fraud — presents a complex analytical challenge. In traditional telecommunication environments, usage- or event-based fraud analysis was the most important component of fraud investigation and analysis. The introduction of expensive customer equipment (CPE) responsible for enabling new service provider products and services to understand the true relationship between service provider and customer is now the key to minimizing fraud activities relating to subscriptions. Examples are highly subsidized smartphone and personal tablet equipment for mobilecos; FTTH set top boxes that provide not only general connectivity, but video and voice from telcos; and combination set top box and personal video recorder (PVR) units from cablecos.

All this high-cost customer equipment represents a significant investment on behalf of the service provider. And yet it is this equipment that often times represents the enablers for the continuing wave of next generation products and services. Despite the value of these units, the pressures to shorten time-to-market on products to gain the first mover advantage does not allow for these units to be watched as carefully as legacy units with established provisioning processes. When fraudsters “obtain” these units by using the subscription identification of valid, or supposedly valid, customers, the result contributes to the estimated $22 billion of subscription fraud worldwide.10

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Preventing subscription fraud is not as easy as preventing usage fraud. The challenge is the requirement to analyze key customer data sources like customer relationship management (CRM), provisioning and billing together with the usage of devices to obtain a clearer picture of the actual use or non-use of a service provider’s infrastructure. The intensity of cross-silo and cross-organization coordination makes this level of analysis difficult, but not impossible.

**Expanding Product Offerings**

The ability to link directly to new evolutions of products enables new revenues for service providers from disparate data sources. For many years, mobilecos have had the ability to link service provider network data with geo-location information. This linking identifies opportunities for location-based services ranging from advertising opportunities in terms of new business models to mobile application services associated with the location.

This level of analysis is more complex than projections of associated network performance because a service provider must link data from multiple operational or business support systems. Unlike linking data sets from internal systems like subscription fraud detection, location-based services require the linking of both internal and external data sources to provide a suitable level of service. Examples of the analytical usage of external data sets are standardized location or mapping information and third party treatment engines that match location and customer with offers or calls to action.

The end-goal is to provide a proper level of business action associated with the descriptive or predictive results associated with the information.

**Competitive Advantage Requires Both Depth and Power**

Telcos, cablecos and mobilecos must seize the opportunity to not only cope with, but master, the tidal wave of data in the telecommunications industry. In the first step, they need to start managing and utilizing the information within the tidal wave of data because the growth rates are not linear, but rather more exponential in nature. As the early adopters and change agents give way to mainstream users, the amount of information both transiting a service provider’s network and relating to the connectivity consumers utilizing that environment will quickly make the growth of the past five years seem pale in comparison.

Some may ask: "Why is it necessary to actively/proactively manage this amount of data?" A traditional telecom strategy views ownership of, or value-add associated with, the data belongs to the service provider. Inherently key to the "virtuous circle" of connectivity consumer data growth is the enabling bandwidth from service providers. And it is this enabling bandwidth that enables both usage habits and new applications. This type of strategy limits service providers to the role of followers rather than leaders in the minds of connectivity consumers. A follower role limits the future margins of service providers to those similar to simple utilities providing water or electricity who are not viewed as enablers of experiences, but rather the "necessary evil" to enjoy those experiences.

Service providers need to start actively managing and utilizing the information within that data tidal wave to avoid that "dumb pipe" status. The ability to proactively manage network and infrastructure resource allocation will provide lower operational costs than competitors. Development of core competencies in indispensable product to connectivity consumers and value-add services to partner organizations will increase revenues and breadth of influence. Yet, without the ability to analyses the depth of the sub-atomic network detail data in real-time and the breadth of customer data with event level network data, service providers will be left with reactively coping with their data tidal wave.

Proactive management of data with a service provider network translates into higher margins, faster time-to-market speeds and first mover agility. All are extremely important in the current telecommunications marketplace. A marketplace, which in less than a decade, changed the measurement of its evolutionary pace to months rather than years.