Communication Service Providers (CSP) and Opportunities from Big Data and Analytics
**Big Data and Analytics in Telecom**

The telecom sector, particularly Communication Service Providers (CSP), have always maintained large quantities of unstructured (Big) Data including large volumes of customer data, operational data, and transactional data. While it is true that telecom service providers have always had the opportunity to manage and analyze large data sets, CSPs have not always had the best tools to deal with data deluge!

The industry has used different technology and techniques at different points of time including statistical analysis, decision support, data mining, knowledge management, business intelligence, and business analytics. However, Big Data and Analytics tools and techniques are starting to make a significant net impact on data management efficiency and CSP effectiveness, such as their ability to identify key trends and needs for customers, which is especially important for the most important enterprise clients.

**Why Big Data and Analytics in Telecom?**

The telecom industry has a few significant business challenges including:

- Demand for increasing customer personalization while keeping costs down
- Need to optimize current processes to ensure that network planning allows for potential increase in revenue, which goes beyond just a network-centric view
- Need to maintain and increase revenue in the wake of increased competition and decline in traditional services

There are many opportunities in which Big Data Analytics may provide insights about a telecom company’s customer base including:

1. Analyzing network traffic in real-time to optimally route the traffic and improve service
2. Real time monitoring of call data records by telecom operators and security agencies to reveal behavior indicative of potential fraud
3. Designing an optimal and flexible call plan in near real-time for customers based on their usage patterns (and potentially involve social media)
4. Gaining insights into customer behaviors and usage patterns, which in turn can help in developing new services and products
5. Leveraging data from social networks and online marketing initiatives by using intelligence from Big Data to gain better ROI on marketing and advertising campaigns (combined with usage patterns as discussed in #3 above)

Analyzing Big Data reveals a more complete perspective of the customer needs. CSPs need to think broadly as they have the opportunity to use data sets from various sources, fused together, correlated and turned into valuable insight with no data being too small or irrelevant. An average telecom operator generates billions of records per day and data should be analyzed in real or near real-time to gain maximum benefits. This is not within the realm of the traditional business intelligence methodologies that have been adopted by operators, which would take days and weeks for collection.
and analysis. Traditional BI will prove limited in situations where new customer applications demand action in minutes and hours.

**Big Data helps CSPs to get insights into customer behavior, their service usage patterns, and preferences, using both structured and unstructured data in near real-time.**

Mobile network operators can use customer data about devices, locations, mobility habits and usage patterns to tailor services and offers for specific customers, thus enhancing customer satisfaction, retention and long-term business. Big Data Analytics solutions can help service providers better understand customer needs/wants, measure business parameters more effectively, and move from a reactive model to being proactive with respect to market changes, potential issues, and managing them.

With such insights it might be possible to generate new insights that can be ported onto third party applications, enabling enhanced customer experiences, and add new sources of revenue. Such efforts can help create a much closer and stable relationship between the operator and the customer, leading to more loyal customers besides indicating entirely new sources of revenue.

Big Data can enhance a telecom company’s operation in search, affiliation marketing, and Internet-based direct marketing besides providing 360-degree view of customer value, personalized marketing campaigns, up-selling and cross-selling leads, next-product-to-buy, or churn reduction.

Big Data and Analytics is also an important tool in fraud prevention and detection. Big Data can help service providers cut across complex organizational structures to collect and analyze relevant fraud data even on a proactive basis. Analysis of Big Data can help take preventive measures immediately and automatically. Analyzing historical payment data or call data records can be help detect and identify fraudulent behavior in real-time.

**Why Big Data and Analytics for CSPs?**

Early telecom networks allowed protocols and changes to be done only centrally in a highly structured process while the network itself did not change very frequently. Over the years there have been many changes such as the migration to LTE and transition to packet networks based on Ethernet and IP technology.

Falling costs of storage and computing in the context of Big Data allows greater amounts of data to be analyzed. The opportunity to leverage Big Data comes with the ability to store applications and data and perform analytics functions locally.

Many CSPs choose areas such as churn reduction as their early Big Data projects. The benefits are almost immediate and significant for many operators that have chosen to use Big Data analytics to cut churn and to generate new revenue.

Telcom operators can collect data from their mobile networks and related user data (texts, calls, Web surfing, etc.) and use insights gained to optimize network operations. Advanced solutions such as Self-organizing Network (SON) equipment can be both a source of data as well as a means of adjusting networks to provide an improved customer experience, which also helps with retention.
Big Data provides a competitive advantage in the communications industry. For CSPs, the emergence of OTT players and the increasing use of smart devices have become a big factor in terms of competition for core voice and messaging services. Accordingly, it is becoming increasingly important that CSPs leverage their huge and growing data assets to bring about service innovations while simultaneously delivering the best possible customer Quality of Experience (QoE). Big Data can help telecom companies transform their business and customer engagement models and become more competitive, increasing customer value and QoE perception.

Real-time Big Data Analytics (RTBDA) is a major topic of discussion with CSPs as it holds the key to unlocking great value in what is happening within their networks. RTBA finds use in OTT companies such as Amazon and Google as they use it as their strategic foundation to make decisions in real-time. RTBDA considers the need to produce results in real time, especially in the context of Internet content and the capabilities to record and analyze events on the network at any given moment.

**Big Data and CSP Data Records**

It is possible to manage telecom networks and data analytics by using CDRs (Customer Data Records), Event Detail Records (EDRs), and IP Detail Records (IPDRs) to understand what is occurring in real-time. These three data sources have become a major source of Big Data analysis for CSPs.

In terms of systems engineering, there is a significant part to consider here about real-time data volume. Whereas earlier systems had to deal with data gathering every few minutes, Ethernet technology (frames in a 10 Gbps) can transmit data with a frequency of about 67 nanoseconds between each frame. This presents a major infrastructure capacity issue in terms of CSP ability to handle data in real-time.

Typically Big Data analytics can be used for two broad categories of decision making: (1) Real-time Decision Making and (2) Enhanced Planning and Service Optimization. The latter is based on trends and predictive analysis, using the same data inputs (for example CDRs and other structured and unstructured data sources) to provide insights valuable to strategy. This has to be supplemented by real-time data to provide optimal operations planning.

By definition, CDRs provide information about the source of the call, the destination, duration, etc. With smartphones, it is also possible to capture a new category of transaction records such as the purchase and download of a song or a video clip, recharge on a prepaid account, or a mobile payment. A CSP can make optimum use of the data they get from these points and use it to build a view of their customers, needs and wants across a broad range of communications, applications, commerce, and content services. This can be used to improve customer experience, profile customers, implement solutions to customer needs, and predict the potential for cross-selling and up-selling (rather than just focusing on churn prediction and intervention).
Sources of CSP Data

Big Data sources for CSPs include phone calls, emails, messages, transactions, log data, social media usage/interactions, geo-spatial data, and various external feeds such as from sensors (NFC, iBeacon, BLE, etc.). These can be split into structured and unstructured data sources as per the below diagrams.

Structured Data Sources

Unstructured Data Sources

* Social media includes Facebook, Twitter, Google+ and other online forum

The sources of CSP data can be viewed differently when we consider the different internal processes, departments or functions as per below matrix.

<table>
<thead>
<tr>
<th>Internal Source</th>
<th>Data Elements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infrastructure</td>
<td>Network events, call records, text and multimedia messages, data traffic volume, location specific data, User data, fault data</td>
</tr>
<tr>
<td>Product Development</td>
<td>Product listing, product life cycle, product and platform costs, innovation road map, product usage, product delivery</td>
</tr>
<tr>
<td>Marketing and Sales</td>
<td>Customer handsets, options and preferences, sales channel, ARPU, marketing campaign response, segmentation, usage level, subsidy</td>
</tr>
<tr>
<td>Customer Support</td>
<td>Orders and contracts, fault handling, resolution time, fault repeats, call center info, termination</td>
</tr>
<tr>
<td>Billing</td>
<td>Call duration, tariff, usage history, customer account</td>
</tr>
</tbody>
</table>

Big Data-Internal Data Sources and Elements
In terms of operational aspects, the sources of data in telecom can be categorized as per the below matrix:

<table>
<thead>
<tr>
<th>Operational Source</th>
<th>Information</th>
</tr>
</thead>
</table>
| Network Data       | Usage Records  
|                    | Performance Monitoring Data  
|                    | Fault Monitoring Data  
|                    | Call Management Data  
| Subscriber Data    | Profile Data  
|                    | Network Registry  
|                    | Operating (Provisioning, OSS)  
|                    | Billing Data  
|                    | Social Media  
| Application data derived from interfaces, channels, software, etc. | Traffic Analysis  
|                    | Web, Search, SMS, Email  
|                    | Social Media Data  
|                    | Mobile apps  
|                    | Device data  

**Big Data Operational Sources**

Additionally, CSPs have multiple sources of data including call detail records from network switches, IDS/IPS alarm, event logs, location logs from towers, event logs from different devices, etc.

**Big Data Challenges and Opportunities for CSPs**

Big Data initiatives require specific and sustained efforts at sourcing and analyzing data. Undoubtedly internal data is the primary source of Big Data within organizations but this is often supplemented by external data. There is significant untapped value in different internal systems. Internal data in telecom companies represents the most mature, relevant and well-understood data available to the companies, which can apply analytics on internal data that is extracted from phone calls, transactions, call center interactions and events that provide valuable information.

For exact, real-time decision making, Big Data systems continuously collect, store, and analyzes network data by using the relevant Ethernet frames and IP packets that are examined in real-time. Big Data systems are able to analyze and react to information in real-time and provide this data as a source of detailed, reliable information on events happening in the network.

Although the Telecom operators have the resources, skill and willingness to take on Big Data projects, they are still running into issues. For CSPs, developing and maintaining Big Data and Analytics applications is difficult and they cannot afford the complexity in business operations. Telecom
operators now see their networks becoming increasingly complex due to many factors, yet Big Data technology promises to derive new opportunities from these networks.

Carriers need to keep things as simple as possible. Rather than simply writing data to storage, telecom and ICT companies in general should stream data to analytics programs in real-time on a 24 by 7 basis. One of the benefits of real-time analytics is that it can help leverage the data that resides in the operators’ multiple systems, make that immediately accessible and help correlate that data to generate insight that can drive their business forward.

There is an opportunity for telecom carriers to sell data derived from Big Data capture, management and predictive analysis to various third parties. However, there are privacy concerns: (both internal and external). The notion of allowing data to be used externally is always an issue, even with “anonymized” data, and Chief Legal Counsel of carriers often put a stop to it.

In terms of internal use of Big Data and Analytics, CSPs can engage in the following:

- **Use Big Data to determine data usage/behavior:** Drive more usage and get customers to sign up for data that are currently non-data users
- **Use Bid Data to drive people to more family/friends plans:** Identify relate users (even if not currently on family plan). This is currently something carriers are doing, but in a very manual way – not mechanized. Need to identify potentially correlated users
- **Use Big Data to “enrich” the data experience:** If they use high volume of video, place them on guaranteed VoIP level of QoS
- **Use Big Data to optimize price plans:** Proactively putting someone in a less expensive plan may represent lost money for the operator, but is optimal compared to losing a customer.
- **Use Big Data to improve customer retention:** Most customers that churn don’t call to warn the operator! Look at their behavior (do they go to website), behavior of influencers, identify influencers and influences

The telecommunications industry is investing heavily in developing the analytical tools and services to take advantage of both their traditional structured data and unstructured (big) data resources. The goals of each carrier program vary, but share some commonalities including the desire to improve business intelligence gathering, customer care and operations.

In the report, *Market for Telecom Structured Data, Big Data, and Analytics: Business Case, Analysis and Forecasts 2015 – 2020*, Mind Commerce identifies opportunities for CSPs to monetize data assets, which is often manifest in new products and services at the business-to-business (B2B) level.

**Summary and Conclusions**

Big Data holds immense potential as it can help CSPs analyze and identify opportunity areas for new and improved products that can be targeted at specific users based on their preferences.

Big Data can provide a comprehensive picture of the company’s operations and its customers and help enhance profitability and operations across the entire telecom value chain, including network infrastructure management, services access and integration, besides marketing and sales.
Data services accounts for an increasing proportion of total operator revenue with the growth of data traffic and Big Data technology can address problems arising out of rapid data growth, scalability, and high cost. Big Data has helped in reducing customer-care calls and in also improving the customer experience and customer churn. Big Data helps make network processes more automatic and/or provide focus more on the customer perspective rather than a merely a network view.

CSPs are also looking at new revenue and business models to be able to make money from new types of customers and not just from end-users. While at the current time CSPs use Big Data primarily for their own benefit, there is a new stream of revenue for these companies in terms of selling data on mobile users' locations, movements, and web browsing habits to other companies. It is expected to grow into a multi-billion-dollar market in itself.

This situation brings into focus a new business model where revenue comes from new types of customers. This is referred to as the asymmetric business model or two-sided market opportunity for telecom operators for whom it presents a business model of significant strategic importance.

This two-sided business delivery model draws from the larger trend of IT as a service and enables telecom service providers to create new revenue streams from the data they handle, enabled to a large extent by Big Data. This new trend has come about due to changes driven by market, regulatory, and economic aspects in the ICT industry. It is estimated that more than 60% of IT business will be part of the two-sided delivery model by 2020 with telecom service providers operating on both sides of this model.

**About Mind Commerce**

Mind Commerce is your trusted source for research and strategic analysis focused on digital technologies and the telecommunications industry. Our reports provide key trends, projections, and in-depth analysis for infrastructure, platforms, devices, applications, services, emerging business models and opportunities.


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- [Big Data in Manufacturing: Key Trends, Opportunities and Market Forecasts 2015 - 2020](#)
- [Big Data in Retail 2015: Market Analysis, Companies, Solutions, and Forecasts 2015 - 2020](#)