White Paper

Real-time network analytics can enable faster, more informed business decisions

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1 Executive summary

Real-time network analytics provides decision makers with information on how resources are being used, their ability to meet capacity demands, and trends that are developing in the customer base that can support the launch and marketing of new types of service. Advances in computing power, drastic reductions in storage cost, in-line session analysis and improvements in data visualization have all combined to make real-time analytics a reality. The days of generating business reports on activity that occurred last month are gone, and have been replaced by the capture and analysis of trends and patterns in a day, an hour or, in some cases, minutes.

Real-time network analytics enables communication service providers (CSPs) to quickly detect issues such as bandwidth constraints, service outages, threats against their networks and problems with new handsets launched into the market, as well as allowing them to manage subscriber loyalty by examining specific metrics that are known to increase subscriber churn.

Many CSPs have vast amounts of diverse data, but do not fully exploit this when making strategic business decisions. The volume of data carried by telecoms networks has increased a thousand-fold in the past 20 years (see Figure 1), and indeed more data has been created in the last 2 years than in the whole of the previous 50 years. Fortune 500 companies are generating distributed data sets so large that traditional database management systems (DBMS) are unable to process the data efficiently to support timely business decisions. The market for network analytics is changing rapidly to handle real-time data feeds that span physical and logical resources. In the telecoms market, operators can use real-time network analytics to detect fraud sooner, assess user sentiment in near real time and target advertising more precisely at specific customer segments.

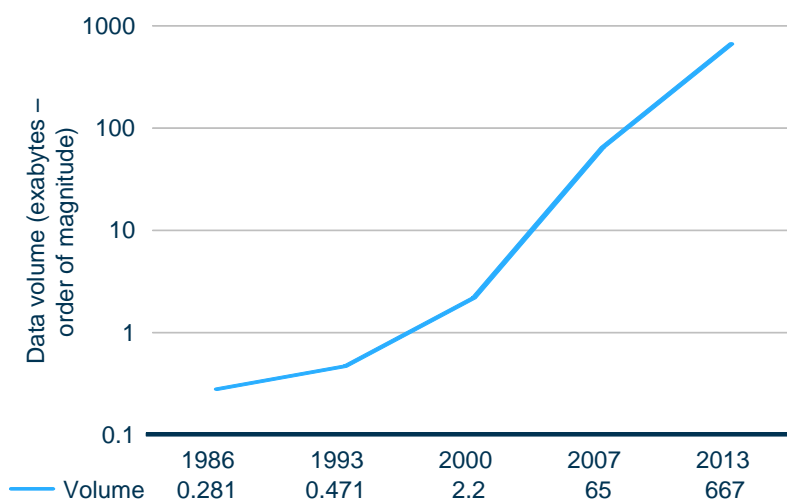|	1986	1993	2000	2007	2013
Volume	0.281	0.471	2.2	65	667

Figure 1: Worldwide volume of data carried by telecoms networks, 1986–2013 [Source: Analysys Mason, 2013]

Despite the volume and diversity of data available, businesses must be selective when deciding what types of data to capture and how it can be analyzed to support their business objectives.

2 Situational overview

The challenge with big data is deciding what data to collect and how to use that information to make better business decisions. A similar challenge existed in the use of data warehousing which stymied business leaders and technologists, and its business benefits were never fully realized. It is important to understand how data is generated and where the value can be leveraged to improve the responsiveness of decision-making. Real-time network analytics is being used in the telecoms market to understand usage patterns and behavioral changes, and anticipate demand when planning future network capacity.

Network analytics helps CSPs to understand the changes in customers' usage patterns for broadband services. In the mobile market, streaming video and other bandwidth-intensive applications are transforming how users access content on wireless devices. The ubiquity of Wi-Fi and limited radio access capacity is shifting how consumers access services on the telecoms network. These technology and market changes have generated a boom in Wi-Fi offloading, which is now becoming the dominant access technology for smartphones. There are several types of offload (as shown in Figure 2):

1   private offload, using home or office Wi-Fi
2   public offload, using a standard Wi-Fi hotspot model
3   carrier-class Wi-Fi, which is a loose term describing a suite of possible solutions to provide users with a
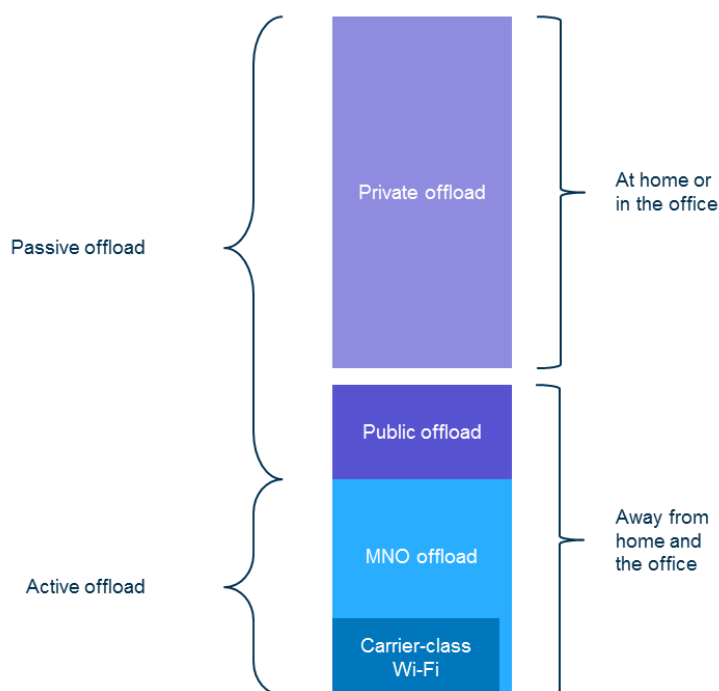   seamless transition between mobile and Wi-Fi data.

Figure 2: Schematic view of types of offload [Source: Analysys Mason, 2012]

The volume and diversity of data originating from different sources of computing devices on the network makes it challenging to interpret the context of data from individual users. Analysys Mason conducted a study in 2012 using on-device trackers to gather device usage data from consumers' smartphones in Western Europe and the United States. We found that overall traffic volume comprised 41% cellular and 59% Wi-Fi. This study shows that, in absolute terms, the incremental growth in media traffic is generated indoors and mainly on Wi-Fi, but in capturing data, CSPs must be able to manage different data inputs to support their real-time analytics decision support systems.

Figure 3 and Figure 5 provide the context of the source of data generated from devices and the overlapping areas where data is accessed between Wi-Fi and the cellular networks.
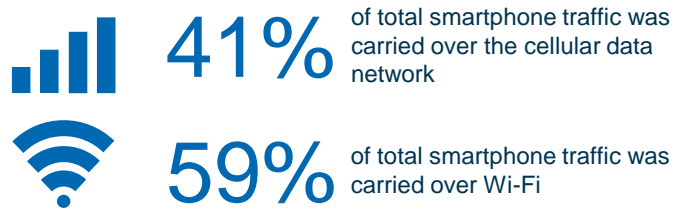

41% of total smartphone traffic was carried over the cellular data network

59% of total smartphone traffic was carried over Wi-Fi

Figure 3: Selected statistics from a panel of smartphone users [Source: Analysys Mason and Arbitron Mobile, 2012]

Smartphone users who do not use data (7%)

Smartphone users with cellular data enabled (82%)

Wi-Fi only (11%)

Smartphone users who use both cellular and Wi-Fi (64%)

Cellular only (18%)

Smartphone users with Wi-Fi enabled (75%)
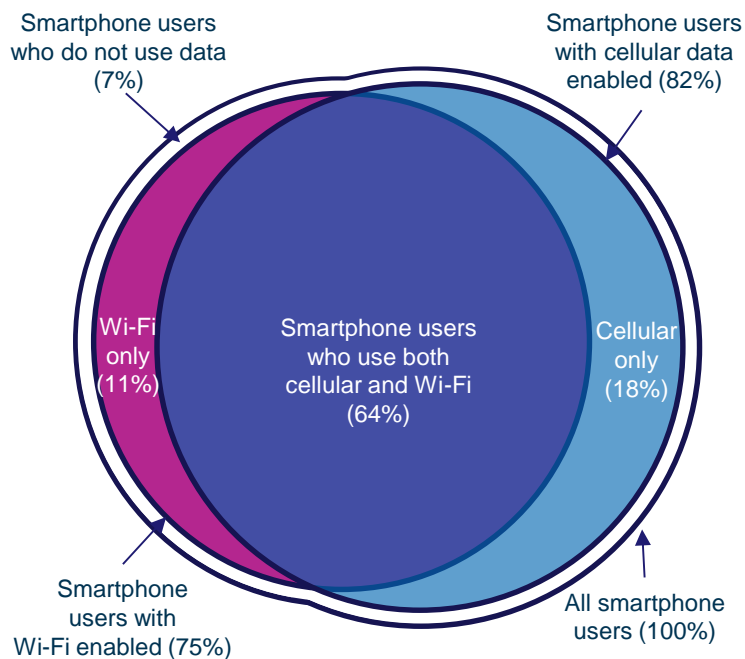
All smartphone users (100%)

Figure 4: Distribution of smartphone panelists, by type of data connectivity [Source Analysys Mason, 2013]

The trend towards more Wi-Fi offloading helps operators plan investments in their networks at specific points where congestion is high. Real-time network analysis enables operators to understand what types of application are being used, how much network resources they require, what time of day usage spikes occur, the location of the device when accessing the network, and more. This complete view is required in order to understand quality of service and choke points in the network, make informed decisions about where to add capacity, and promote value-added services to specific customer segments based on their usage profile.

The factors that impede the use of real-time network data are both technical and organizational. On the technical front, operators have not fully exploited the potential for data transformation to capture and normalize data from the various software systems deployed in their operational environments. On the organizational front, individual business units may be reluctant to provide access to data that could be beneficial to other departments within the operator. For example, the network operations department has valuable real-time network data that could be used by the marketing and customer care departments, but this data may not be shared because of limited budgets and in some cases a lack of awareness of what data is available and how it could be used. The figure below illustrates the diversity of data and how it may be used to understand consumer attitudes about the services, potential interest in buying new services, and overall satisfaction with the services that are currently used each day.
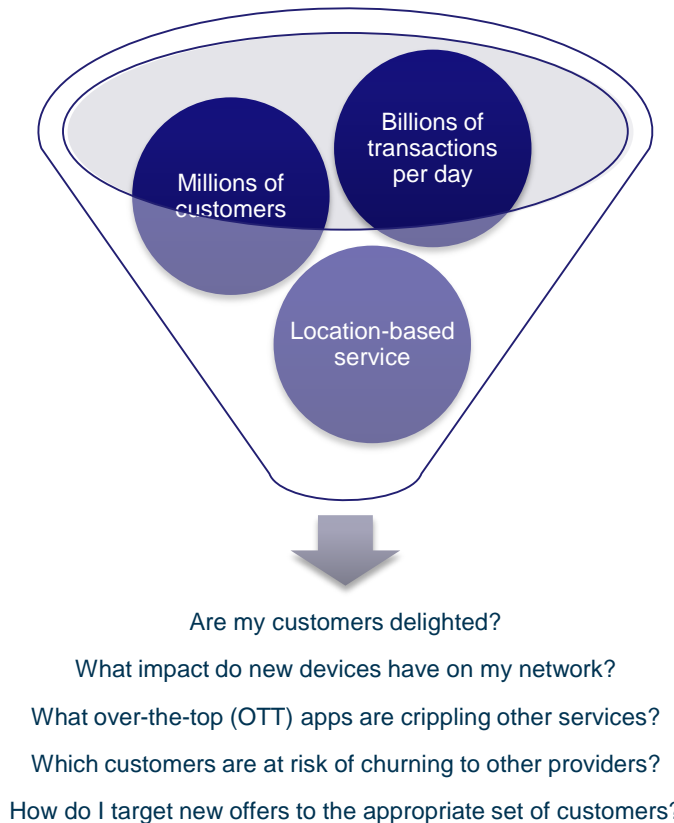
Figure 5: Harvesting
real-time network data
to act now and predict
future scenarios
[Source: Analysys
Mason, 2013]

Are my customers delighted?

What impact do new devices have on my network?

What over-the-top (OTT) apps are crippling other services?

Which customers are at risk of churning to other providers?

How do I target new offers to the appropriate set of customers?

The sharing of real-time network data analysis across different departments has enormous benefits for CSPs in terms of competing with over-the-top (OTT) providers and generating new sources of revenue. The average customer of a CSP generates data entries on a daily basis, and this information helps CSPs to understand subscriber usage behaviors. Most Tier 1 and 2 CSPs collect billions of data records per day, but these are only used for billing and troubleshooting activities. The quantity of data collected is forecast to increase as broadband data services proliferate. CSPs' customers generate data across a number of dimensions, such as social network patterns, location, devices used, content accessed, online transactions and demographics. CSPs know more about their customers' financial status and patterns of usage and behavior than most providers of OTT telecoms services. The increased use of smartphones and improvements in location-based technology enables CSPs to identify the location of consumers within 100 feet, information which can be used to target advertisements more precisely. Operators are learning how to leverage that data, both for internal decision making and by providing the information to third parties. A completely new customer dimension that operators now have access to is content. The ability to understand what types of website and apps their customers access gives CSPs a more detailed overview of their profile and provides precious information to underpin content strategies.

As an example, Telefónica Digital recently announced an offer known as Smart Steps to monetize location-based data for O2, a mobile network operator subsidiary of Telefónica. O2's network data is combined with market intelligence data via a partnership [and then sold to retailers to promote specific offers to customers. This is generating an entirely new source of revenue for Telefónica Digital.

We believe that the use of analytics has significant potential to reduce operational costs, improve customer loyalty and generate new sources of revenue. Real-time network analytics has three dimensions, and a combination of all three creates a distinct advantage for businesses that develop a big data framework architecture and commit the funds needed to deliver their vision.

As shown in Figure 6, the three dimensions are:

1   **real-time network data capture and processing**: provides detailed data capture that can be used for assuring service quality, improving call center efficiency, optimizing revenue, and benchmarking a service against other services and competitors
2   **customer data enrichment**: provides business intelligence about customers, including their usage patterns, location and movement, device operational data, and credit worthiness
3   **market segmentation**: provides user profiles, demographic mapping, buying preferences, and optimum placement of advertisements.

Figure 6: Sources of network, customer and market data [Source: Analysys Mason, 2013]
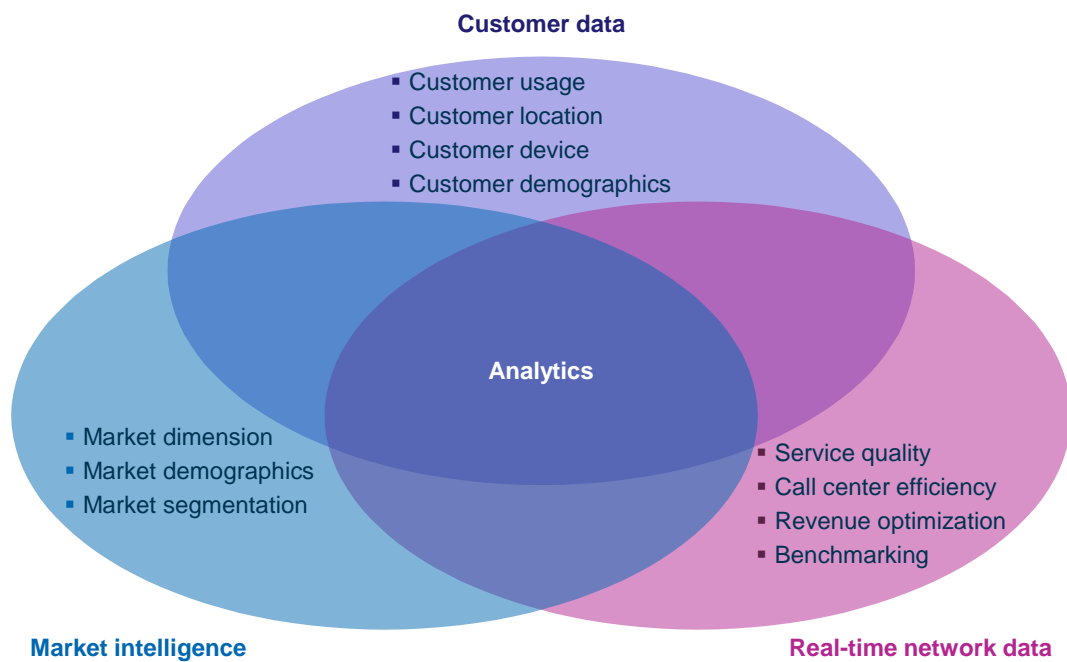
3 Market opportunity

Our research of the big data, real-time network analytics market reveals that CSPs are generating business benefits in less than one year to support strong business cases. Figure 7 summarizes five types of real-time network analytics project with short- and medium-term benefits, including the objective at the start of the project, the business impact, and the timeframe.

Figure 7: Examples of real-time network analytics projects with short- and medium-term benefits [Source: Analysys Mason, 2013]

Project	Objective	Business impact	Timeframe
Decrease churn	Emerging markets have significant churn rates (+50%) and most customers are prepaid. Even relatively small reductions in subscriber churn can have a dramatic effect on profit margins	Identification of users who have a high probability of churning by using KPI metrics. An understanding of users' roles in social networks and their ability to influence other users	3–6 months
Cross- or up-sell products	Sell more (for example, music or games via social media or m-commerce outlets) using the Amazon model – "customers who bought this item also purchased these items"	For data services, customer profiling enhances the take-up of particular products based on usage patterns and demographic profiles	3–6 months
Improve customer experience	The customer experience occurs at the evaluation, purchasing, delivery, billing, consumption, and support touch points	Customer satisfaction can be increased through a more complete understanding of the customer	6–12 months
Faster mean time to resolution	Data abstraction from network operations is put in the context of first-line call center support	Fewer call escalations to second- and third-line support, faster problem resolution, and lower operational support cost	6–12 months
Improve financial performance and profit margins	Operators face tighter margins as prices continue to fall, and major investment in infrastructure is required to remain competitive	Analytics can be used to assess credit risk, identify optimal routes for interconnect, and defer unnecessary capital investments	6–12 months

4 Case studies

The following case studies illustrate the type of business benefits that can be achieved using real-time network analytics in conjunction with current software systems for capturing business intelligence.

Use case: A Tier 1 CSP in the US uses real-time analytics to improve marketing effectiveness

Business drivers

- The CSP wanted to launch an aggressive marketing initiative to increase ARPU, profitability and customer retention. It wanted to deliver highly targeted offers to about 33 million customers via different channels including retail stores, customer care agents and SMS.

Operations approach

- A marketing campaign of this nature and scale required real-time analytical capability that would enable the CSP to build and customize offers in real time. It would be largely targeted towards the non-smartphone users (about 24 million).
- It wanted a single unified view of the customer that would take into consideration all the interactions that they had with the CSP across different channels.

Software strategy

- The CSP needed an underlying IT platform that would enable the sales and marketing teams to quickly find out how well their marketing strategies are working. The platform should allow them to uncover customer insights and then act on those insights in minutes instead of days or weeks.
- The CSP deployed an analytics platform, extending its relationship with the vendor that supplied solutions for financial, supply chain, and human resource functions.

Deployment

- The CSP migrated 2 billion customer records to an automated IT system based on the analytics platform.
- This allowed the company to run the necessary reports with an average response time of just 5 seconds. It is now able to scan 24 months of historical customer records, providing a larger data set from which to draw conclusions, whereas in the past this was only 3 months.
- The new analytics platform was fully deployed within 12 weeks.

Benefits

- The CSP has increased its runtime query performance by between 50 and 60 times, which allows the marketing teams to interact with vast amounts of data in real time and assess the effectiveness of the marketing campaigns within a day of them being launched, whereas in the past it would have taken as long as 2 weeks.
- It is now able to respond to the needs of the customers in real time, giving it a competitive advantage and the ability to improve the quality of the customer experience.

Use case: A European MVNO achieves an unified view of service usage and profitability of its fixed–mobile business customers

Business drivers

- To optimize the business performance and ensure customer profitability across the fixed–mobile converged solution, the CSP needed to understand and manage the performance and usage of its services.
- The CSP wanted to monitor service quality and proactively avoid churn among business customers.

Operations approach

- It wanted to link the usage of its different services to a single profile of the customer. The aim was to deliver a unified view of the business by combining product, billing, traffic, and customer data.

Software strategy

- It commissioned a single OSS reporting system to perform unified real-time network analytics. The expectation was to gain visibility and control of the business at a customer level.

Deployment

- The solution was deployed in a best-of-breed architecture with the analytics platform and deep packet inspection (DPI) probes provided by different vendors.

- The solution combined data from CRM, billing, and network management systems – covering tickets, prices, traffic data, handsets, fault codes, locations, and customer data – and produced a unified data model ready for analysis.
- The completed solution provides regular unified reports for all business lines to the senior management, sales and marketing, delivery, finance, legal and product management departments. These automated reports provide detailed information about customers' behavior and usage – including top customers, revenue, profitability, volumes, service levels, and service reliability.

Benefits

- Improved profitability as a result of more-efficient business management from instant access to key business indicators. The CSP can optimize packaging, tariffs and pricing based on actual service consumption and revenue.
- Cost savings and improved operational efficiency with access to information that was not available before; the usage of real-time network analytics has significantly reduced requests for bespoke and ad-hoc reports from across the organization.
- By delivering the reporting data via its customer portal, the CSP is able to provide service-level reporting for mobile customers as a value-added service that increases customer satisfaction and reduces churn.

5 Cisco Prime Analytics

Cisco is committed to delivering an intelligent network with unique technology that enables streaming analytics. In May 2012, Cisco acquired Truviso, a provider of real-time streaming analytics solutions, in order to bolster its programs for subscriber control, network management and service awareness. In July 2013, Cisco launched Cisco Prime™ Analytics, a network-centric, streaming real-time analytics platform based on the Truviso technology.

Cisco provides a diverse set of data sources that enables it to support CSPs in gaining a unified view of customer usage, network quality of service across multiple domains, and clear evidence of network usage in the IP network. Cisco has also been deploying network data analytics solutions at large Tier 1 CSPs in Wi-Fi offloading mobile broadband traffic, providing CSPs with clear visibility of changing usage patterns.

The Cisco Prime Analytics platform is able to collect network data from other Cisco Prime applications, third-party element management systems (EMSs), network management systems (NMSs) and domain managers, NetFlow, and also deep packet inspection (DPI) and probes. Cisco Prime Analytics can also bring in data from other non-network sources, including social media feeds, point-of-sale and service desk information, and mobile device location.

Cisco is the leading supplier of IP access, edge and core routing, and switching to CSPs worldwide. The Cisco Prime portfolio of OSS and management solutions provides a diverse data set of network information that can be used in analytics.

The addition of real-time streaming analytics capabilities to the Cisco Prime solution set comes at a time when an increasing number of CSPs are starting to invest in real-time network analytics and customer experience management solutions. . Cisco Advanced Services can work with CSPs to understand their business requirements and business impacts based on real-time network activity. With this input, Cisco Advanced Services or partner of choice can design, develop and deploy a solution based on Cisco Prime Analytics to helping drive more efficient and timely business decisions.

Cisco is in discussion with a number of CSPs to implement multiple use cases for network analytics (using Cisco Prime Analytics) pertaining to root-cause analytics, avoidance of recurrence of network issues, SLA validation and network optimization, and new revenue generation opportunities.

Cisco has a vast installed base of Cisco Prime solutions, particularly in North America and developed Asia–Pacific, and a growing presence in all other regions. Figure 8 reflects a sample of data source types that can be collected by Cisco Prime Analytics for real-time data analysis to support actionable events and dynamic dashboards.
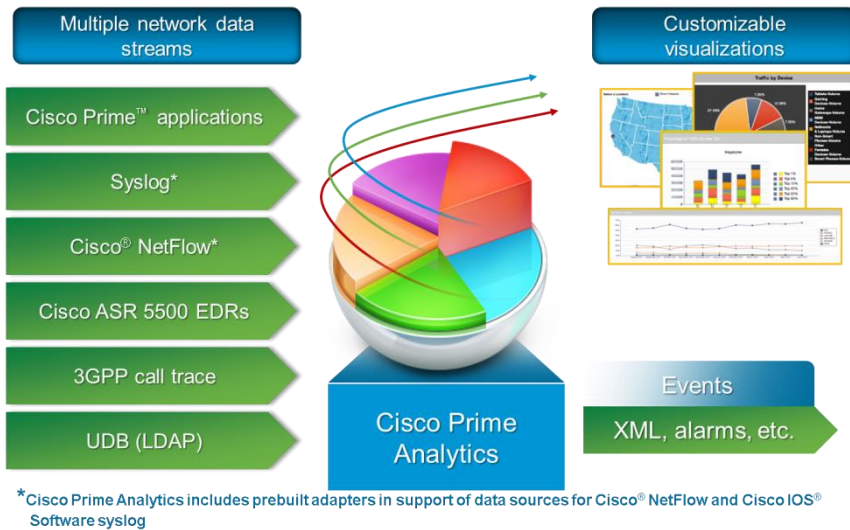
Figure 8: Cisco Prime Analytics supports Date in Motion [Source: Cisco, 2013]

6 Future outlook

Machine-to-machine (M2M) services, location-based services, social networking, RFID, mobile commerce and video surveillance market opportunities will drive the need for advanced visualization of real-time data. Real-time network analytics will enable CSPs to exploit the billions of dollars of capital investment in their own networks in order to track consumers' buying patterns. In specific enterprise industry verticals such as the utility, healthcare, and retail sectors, CSPs will be able to aggregate data in real time to support business decisions. As cloud computing matures, real-time network analytics will support immediate action, enabling 'just-in-time' business intelligence to add capacity and support the elastic nature of a subscriber-based economy.

About the author

Patrick Kelly (Research Director) sets the direction for Analysys Mason's Telecoms Software research stream, which focuses on identifying the rapidly growing segments in the telecoms software market and providing forecast and market share data by region and service type. He has produced research on policy management, cloud computing, LTE and mobile backhaul, IP next-generation service assurance, and customer experience management. Patrick is a frequent speaker at industry and user group conferences. He holds a BSc from the University of Vermont, and an MBA from Plymouth College.