White Paper

Proactively Managing Customer Experience With Real-Time Analytics

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The Growing Relevance of Analytics to CSPs

Analytics have a more strategic role to play across a communication service provider's (CSP) entire business than ever before. While network operations have an obvious need to quickly identify the root cause of device, application and network issues to assure network quality, managing the actual service experience of customers in real time has now become table stakes. Why? As customer expectations of service providers continue to increase along with digital competition, there is pressure to deliver an excellent customer experience. For service providers, this means transforming legacy processes and systems in order to measure and proactively manage the actual quality of service (QoS) that customers experience, in real time. This involves shifting focus from reacting to network issues to predicting what could happen and taking proactive action to avoid subscriber impact.

This is reflected in the move by CSPs to set up service operations centers (SOCs) to monitor and measure the quality of actual services that customers buy as a way to manage customer experience. The journey to network functions virtualization (NFV) and cloud services that are chained together in real time using different virtual network components will further increase the demand for new tools that can provide highly accurate and automated proactive analytics, per session, per customer.

This paper focuses on the market trends that are driving the next wave of proactive analytics and what will be required to measure the service experience in real-time, per-customer sessions, as well as the role of analytics in predicting customer behavior for richer engagement. The paper also examines the benefits CSPs can gain from advanced analytics, including better customer engagement and monetization, as well as increasing customer satisfaction and retention. Finally, we look at the business case and how to use analytics to deliver business value.

On-Demand Networks Are Driving Change

NFV Represents an Inflection Point in Building Networks & Services

NFV represents an inflection point in the way that network services will be created. Instead of building generic, "one-size-fits-all" networks where services are configured on top of preinstalled and pretested components, CSPs will spin virtual network components up on demand to meet the specific needs of customers and their services.

The way CSPs build networks has a big impact on network operations. NFV is highlighting the need for new approaches and tools, both for fulfilling services and assuring them in a dynamic environment. CSPs must be able to assure the compositions of virtualized network functions (VNFs) they instantiate on demand to support customer-facing services so that they can guarantee service performance and availability. Services and the virtualized infrastructure they depend on must be assurable as soon as they come into existence or the speed advantages of virtualization are lost.

This will require tightly integrated and automated insight and analytics of virtualized network infrastructure, devices, customer profiles and application and service provisioning and assurance, customer usage and behavior and – of course – real-time service experience monitoring. For example, if a virtual network is created on demand for a customer service, then a virtualized active probe – which is itself a VNF – can be spun up on the fly, too, as part of that virtual network. Real-time analytics on data from the active probe is essential to provide a service-specific, real-time understanding of the customer's experience.

Figure1: Measuring & Improving the Customer's View on Quality of Experience

DEVICE
- What device is the customer using?
- IMEI, TAC, User Agent

LOCATION
- Where is the customer located?
- Service Area, GeoPOS

CUSTOMER
- Who is the customer?
- Post-paid, Roamer, VIP, Enterprise, MVNO

- What service is the customer using?
- How is it performing?
- Voice, SMS, Streaming, Web Browsing

SERVICE
- What network resources are used?
- Are there any network issues?
- Cell, APN, SGSN, MME, PGW, SGW

NETWORK

- What errors did the customer experience?
- Error code, Cause code, Release code

ERRORS IN CUSTOMER EXPERIENCE

Source: IBM Analytics

The Rise of Service Operations Centers

Service provider networks are key enablers of digital service delivery and, in order to stay relevant, service providers must be proactive in providing the high-quality services their customers expect. Traditional network operations center (NOC) tools and processes are highly network focused and so lack service, customer and business context. How is the service experience through the eyes of customers? "I'm trying to watch TV on my iPad and can't because it keeps lagging, I'm not happy with the service." In this case, CSPs want to see the service layer; monitoring only the resource and network layer is not enough, because service providers must understand, for example, why the video is not downloading at all, or not downloading fast enough.

Many customer-oriented CSPs are setting up SOCs to monitor services in real time, end to end. SOCs are focused on real-time monitoring of all the services and prioritizing and resolving network issues that may impact high-value VIP customers or customers that may be at risk of churn. This requires having a single view in real time of the subscriber experience across networks (edge and core, fixed and mobile), devices and services or applications being used.

The SOC plays an intermediary role between the customer-facing departments, such as customer care, sales and marketing, and network teams, such as network operations and engineering. Ideally, all teams are using the same data and analytics in customized views. In the future, it is more likely that SOC-based operations are equally involved in the commercial side and working more closely with marketing on how to apply analytics to generate additional revenue. By implementing big data analytics as part of a SOC implementation, CSPs can develop targeted use cases, such as creating granular customer segmentation, providing persona-based differentiated offers and introducing real-time marketing campaigns.

The application of advanced methods of predictive analytics and machine-learning techniques will make it possible to anticipate service-quality degradations with

a reasonable level of accuracy, enabling CSPs to take proactive action or even automated preemptive action.

> *So where is your business on this journey to becoming a customer-centric service provider? What will on-demand networks and real-time service chaining and the need to have an end-to-end and contextual customer view of actual service experience require from analytics tools?*

Moving the Customer Experience Forward

Real-Time Per-Session Analytics of Services Will Require New Tools

End-to-end visibility of service quality from the customer perspective: CSPs that want a customer-view of service quality in or near real time will need to have a view across all services the customer buys, as a poor experience with one service can cause dissatisfaction and present a churn risk. This means a service quality view across all services – fixed and mobile – including mobile data, messaging, IPTV, WiFi, social media apps, video sessions, enterprise cloud services, etc. This can then be correlated into a customer experience index (CEI), an inside-out KPI that is calculated on the basis of different interactions with a service provider. The CEI can then be looked at in real time across different customer segments, e.g., enterprise or VIP customers.

Figure 2: Service Quality Experience Per Customer Across Services
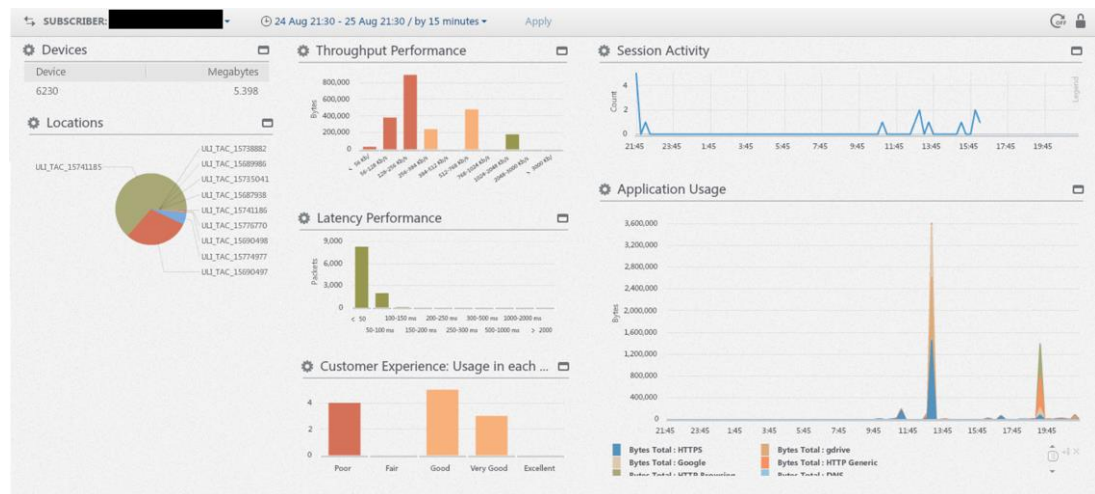
Source: IBM Analytics

New digital service provider business model: As CSPs transition to digital service providers, the ecosystem become more complex. CSPs will be less likely to own the whole value chain and may for example just be providing the connectivity but not the software platform, e.g., video content providers and Internet of Things platform providers, etc. However, CSPs will still need to analyze the application performance and assure services from third parties.

Figure 3: Third-Party Application-Level Performance & Customer Experience
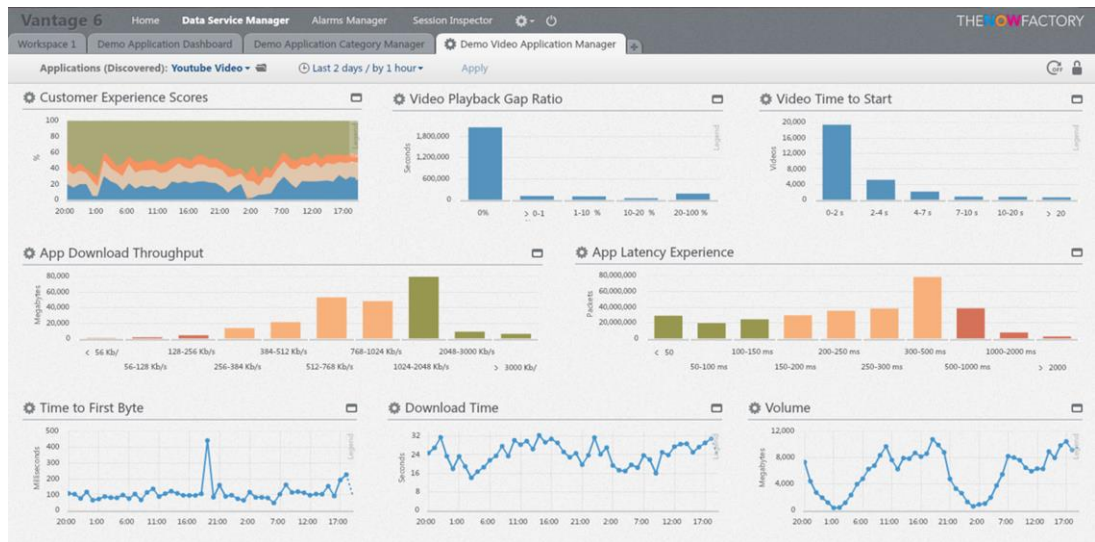
Source: IBM Analytics

Intelligent analytics to prioritize service-impacting issues: Intelligent analytics can quickly find out root causes of network issues and locations. This enables CSPs to quickly figure out where the customer problem is – the network, the application or the device? It should also be possible to drill down to network issues by location to a specific cell site and overlay that view with other data, such as CEI on high-revenue customers, e.g., enterprises or heavy mobile data users.

Figure 4: Customer Experience Analytics on Video Streaming Applications
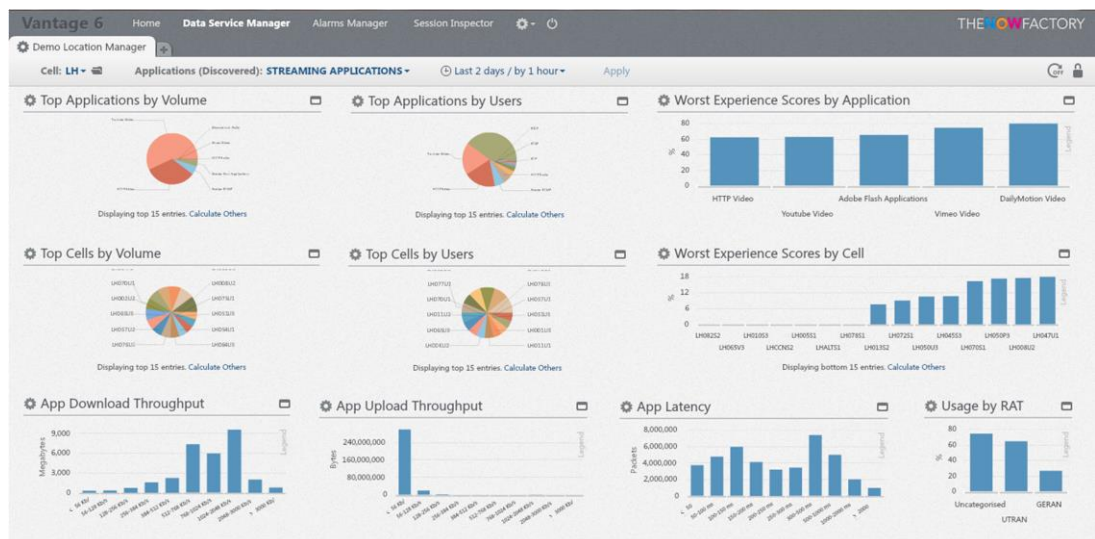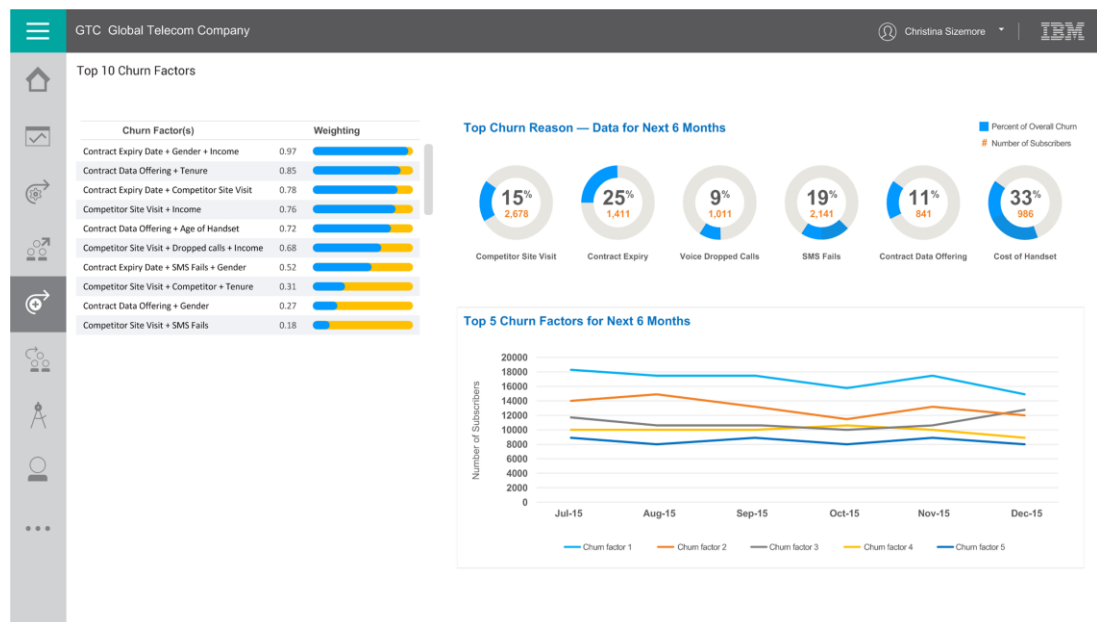

Source: IBM Analytics

Analytics could also be applied to a particular service, such as video, by analyzing processing times by location or other advanced filters to quickly spot the worst-performing network sites.

Monetization and commercial focus in real-time per session analytics: Network performance isn't everything in driving customer perception. A case in point is MVNOs that have higher net promoter scores (NPS) than network CSPs, yet they both use the same network! Service providers are starting to realize that customer analytics looking at real-time service quality and proactively managing churn indicators can provide valuable insight to commercial teams that need to understand the end-to-end customer experience. For analytics to be efficient and strategic, business teams, as well as IT and network operations, must have open access to the data. They also need portal access that allows them to customize views and reports and allows for easy integration to digital marketing, billing and real-time revenue management solutions.

Openness and ability to pull data from all key data sources in real time: Open architecture does not just mean open source, but it has become critical that CSPs are not held back because of integration issues or incompatible systems. A key requirement is that the analytics platform has open APIs that can integrate with open source big data platforms, such as Hadoop. The analytics platform must be able to pull data from anywhere in the network across a range of sources, e.g., devices, probes, DPI and policy engines, gateways etc., as well as being able to integrate with APIs to customer billing systems, customer care systems, service assurance, etc. All of these capabilities are essential to ensure that CSPs get a more strategic 360-degree view of customers across network, service, billing, customer care, digital marketing, etc.

Predictive and automated analytics: This is really what most CSPs would like to be able to do – anticipate problems *before* they become "customer problems."

Figure 5: Predictive Churn Analytics Linked to Data Services Experience Metrics

Source: IBM Analytics

Today, it is possible to predict and control network quality based on algorithms and events, e.g., new devices or a major sporting event or conference in a particular area. It's also possible to understand customers better and take proactive action to alleviate service impact by overlaying network and service data with richer customer lifestyle, demographic and behavioral insight, such as applications used and locations visited.

In the future, there will be self-organizing and self-healing virtualized networks where network and service automation and predictive analytics anticipate service quality and add network capacity automatically as needed. In order to do real-time, per-customer sessions at scale, analytics platforms must be capable of efficiently handling large volumes and crunch the data associated with millions of customers and their services. The accuracy and quality of mediation and streaming analytics engines is also critical, since that will be forming the basis for decision making across the organization, including accurate, complete network data for all revenue-assurance operations.

> *Are you able to see the customer experience on the network for all your customers in real time? Can you make the business case for a single solution with open architecture that can support terabit networks for all stakeholders with a common look and feel? Do you have specific use cases to also bring commercial teams on board, e.g., how to automate proactive action to support sales and retention?*

The Business Case for Proactive Analytics

CSPs gain several benefits from using proactive analytics both on the service operations side *and* the commercial side of the service provider's business. Usually CSPs start with key use cases that are causing the business some operational or financial pain:

1. Operational Efficiency

Proactively anticipate and reduce faults: Analytics identifies and prioritizes service or customer-impacting issues rather than just network issues. Predictive analytics and machine learning can detect anomalies in networks and services and pinpoint what may be contributing to faults or outages, e.g., CPE or device issue or a particular mobile cell is over capacity. This enables CSPs to take proactive action to reduce subscriber impact by fixing the problem before the customer even notices.

Gain common view of customer-impacting issues: Everyone in the organization gains a common view of service performance. Network operations can prioritize solving issues with most subscriber impact. A problem with a particular customer's service can mean that customer care can anticipate the reason a customer may be calling in. Commercial teams can analyze and segment customer data with overlays to detect customer preferences and behavior, e.g., customer care, billing and richer insight on behavior, demographics, etc., to improve digital marketing campaigns.

Improve customer experience and satisfaction: Customer analytics brings the voice of the customer into the organization. Analytics enable rapid problem identification and proactive resolution since they reflect the customer experience of the service in near-real time. This enables CSPs to provide better services, raising customer satisfaction levels. It's also possible to correlate NPS, a static outside-in measure where a customer rates a service provider, with a CEI representing actual service quality

experience through analytics. This makes it possible to identify potential detractors in the network statistically on a daily basis, rather than relying on a static NPS score done monthly based on a small customer sample. With digital self-care supported by analytics, customers also gain real-time, deeper, more-accurate insight into the performance and cost of their services, which many value, increasing their satisfaction.

2. Cost Reduction

Reduce network operation costs: CSPs can run the network "hotter," because more real-time intelligent analytics can optimize and, in the future, help to automate network capacity based on technical and QoS parameters. Smaller operation teams can reduce time spent on manual network troubleshooting and speed up problem resolution. CSPs are also reducing the number of NOCs globally for efficiency reasons and fewer people can manage the services. Network investment planning can also be more targeted and linked more directly to customer experience improvements.

Reduce customer care costs: This is being achieved by using analytics to proactively resolve service issues and reduce the number of calls to customer care. The speed at which calls are resolved can be improved by providing care agents with likely reasons why the customer may be calling and proactively suggesting a fix. Digital self-care fuelled by analytics also reduces the costs of call-center staff and feeds customers service information and troubleshooting advice in real time.

Reduce costs of in-house analytics: By deploying a high-performance analytics platform with intelligent algorithms that comes with deployable use cases built in, service providers can gain time to value advantage on key use cases and avoid lengthy customization cycles. This also reduces the difficulty of finding and the expense of maintaining teams of data scientists and consultants to develop and customize an analytics solution. Service providers are trying to be more efficient in collecting "relevant data once" and reducing the number of in-house business intelligence staff fielding analytics requests from business users. There are intuitive platforms out there that can be customized to the needs of different departments and business users – all using the same set of data.

3. Revenue Growth

ARPU growth and customer base value management: This is really about using analytics to drive average revenue per user (ARPU) through better customer engagement, proactive churn management and personalized, one-to-one marketing. Service providers are using location-based analytics, richer demographic and customer marketing data and omni-channel KPIs, e.g., near the end of a customer's contract, to drive one-to-one marketing that is personal, context-dependent and "just in time" or "next best" offers, such as extra mobile data. It can also be used to develop targeted use cases and granular customer segmentation to market differentiated offers or real-time marketing campaigns.

Reduce churn: Predictive service quality management helps detect possible churners and deliver proactive customer care to prevent churn, e.g., fixing a problem before the customer notices, or sending a text to the customer to explain that the service provider is aware of an issue and is fixing it. The next stage of more advanced SOCs will be to play a role in revenue generation by identifying new service opportunities and cross-sell and up-sell opportunities based on customer usage patterns and behavior.

High-value customer segments: It is important to proactively manage in real time the quality of experience of high-value customers, and detect any service degradations.

With CEI, service providers can build use cases to manage VIP customers – through call centers or alarms – and identify when services are impacted and which customers are affected, e.g., what are the ARPU and the value of customers impacted. With proactive analytics, service providers can also look at specific events or patterns that may have impacted service quality, and take steps to fix them.

Conclusion: A Journey to Customer-Centricity

It's still early days for service providers in terms of using analytics effectively across the business. Service providers are serious about improving the customer experience, using analytics to improve service performance, and getting to know customers better. A key factor for service providers in driving a customer-centric culture will be involving all key groups and departments in using customer data and service analytics. This will help to drive common insight and KPIs, as well as enable proactive (and, in the future, automated) actions to be taken across technical and commercial teams.

Becoming a customer-centric digital service provider means having efficient customer-centric processes. Service providers are starting to realize that they sit on a gold mine of data; they just need to dig it up. This means overlaying network and service analytics with CRM data, consumer application usage, preferences, mobility patterns profiles, typical usage location, NPS and CEI for churn predictors to get a richer picture of customers (of course, under data privacy guidelines). This kind of data will be key to compete against digital competitors and also to move into new areas, such as mobile advertising, anonymized customer data and analytics to SME/enterprise customers, etc.

The move to SOCs is a positive development for service providers as it puts the focus clearly on the actual service experience and prioritizing events that impact services, not just broader network issues. SOCs can play an even bigger role in the future in terms of identifying new services, as well as upsell opportunities, and in proactively engaging customers based on their particular interests and behaviors.

Predictive, real-time analytics will play a key trusted role in virtualized networks. While NFV and SDN telecom networks are mostly still in trials or testing stages, service providers are starting to realize that operations teams will require highly accurate and trusted analytics on a per session per customer level to quickly control or double-check policy on service orchestration and automation. In addition, predictive analytics and machine learning can be used to identify service anomalies or service-impacting events and allow such events to be proactively managed.

All relevant customer data will need to be stored and analyzed. Today the approach to customer experience analytics is fairly piecemeal and use-case driven. Most CSPs focus on network and service experience analytics and treat additional customer insights related to CRM, channel usage and customer care, OSS and BSS data as something separate. We expect that view to change as it makes sense from a purely efficiency standpoint to collect all relevant customer data once and have it stored and accessible by any user or department. By blending the insight from different sources, the customer experience and monetization can improve – if you look at the customer in a disjointed way, you don't provide a joined-up experience. It's better to integrate data sources in an open analytics platform that can ingest data from probes, DPI engines, OSS, BSS, etc., to get a unified view of customers and really focus on engagement by subscriber or segments of subscribers, thereby allowing prioritization based on service impact and growth opportunities.

In terms of choosing analytics solutions, look for openness, accuracy and high performance in mediation, which will be especially critical in virtualized on-demand networks and services. CSPs should choose an open analytics platform that can handle volumes of data from mobile and fixed networks. Such a platform is likely to be Hadoop-centric to reduce hardware costs, it will have modular extensions to support real-time data analysis, and it will also provide SQL access to the data. An open analytics platform must be flexible to support new services, e.g., IoT or edge computing, and open in terms of APIs and being able to pull data easily from multiple sources. Physical and virtual network components will exist for a period of time, so the analytics architecture must be able to support both during the transition stage.

Support from senior management to drive CEM is perhaps even more important than the technology itself and is needed to drive cross-organizational cooperation over the collection of data from multiple different sources, as well as making it available for multiple use cases within a big data management platform. Leading CSPs already recognize CEM's contribution to business performance and prioritize CEM initiatives: now CSPs starting out with CEM need the same support and funding.

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