Independent market research and competitive analysis of next-generation business and technology solutions for service providers and vendors

HEAVY READING
WHITE PAPER

Manage Streaming QoE With Cloud & Network Analytics

A Heavy Reading white paper produced for Nokia Corp.

NOKIA

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INTRODUCTION

The Internet has grown up into a complicated teenager, with intricate network topologies, the deployment of global content delivery networks (CDNs), the explosion of streaming video, IPTV and real-time voice and video communications. This has shifted demands on the Internet from best-effort pipes to a reliable, end-to-end transport mechanism for high-quality content and services with assured quality and performance.

Consumers increasingly depend on cloud apps and video-streaming services such as Netflix, Hulu, YouTube, WhatsApp, etc. Nokia Bell Labs reports that these apps account for 60 percent of Internet traffic today, rising to 80 percent by 2020. According to the Nielsen Video 360 2017 report, U.S. teens are most likely to stream videos, but online video consumption is growing across age groups. Almost twice as many people in the U.S. are streaming and downloading movies this year, and approximately 25 percent have live-streamed events, particularly sporting events.

If a customer is having a problem watching a bandwidth-heavy streaming app such as Netflix, they will complain about the network performance to their service provider. If problems continue, they will likely switch to another network provider.

Traditional network operations center 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? In addition, many popular cloud apps are encrypted, which means CSPs have little visibility into what these apps are or their impact across their network. If a customer reports, "I'm trying to watch TV on my iPad and can't because it keeps stalling; I'm not happy with the service," communications service providers (CSPs) want to see the service layer, and must be able to pinpoint and quickly understand why the video is not downloading or stalling.

This white paper looks at how CSPs can use multi-dimensional big data analytics to see how cloud apps and services are impacting the network in real time, and help pinpoint and quickly resolve streaming issues. The paper will also examine key use cases of CSPs that have deployed analytics to help solve streaming video problems.

CHALLENGES MANAGING CLOUD & STREAMING APPS

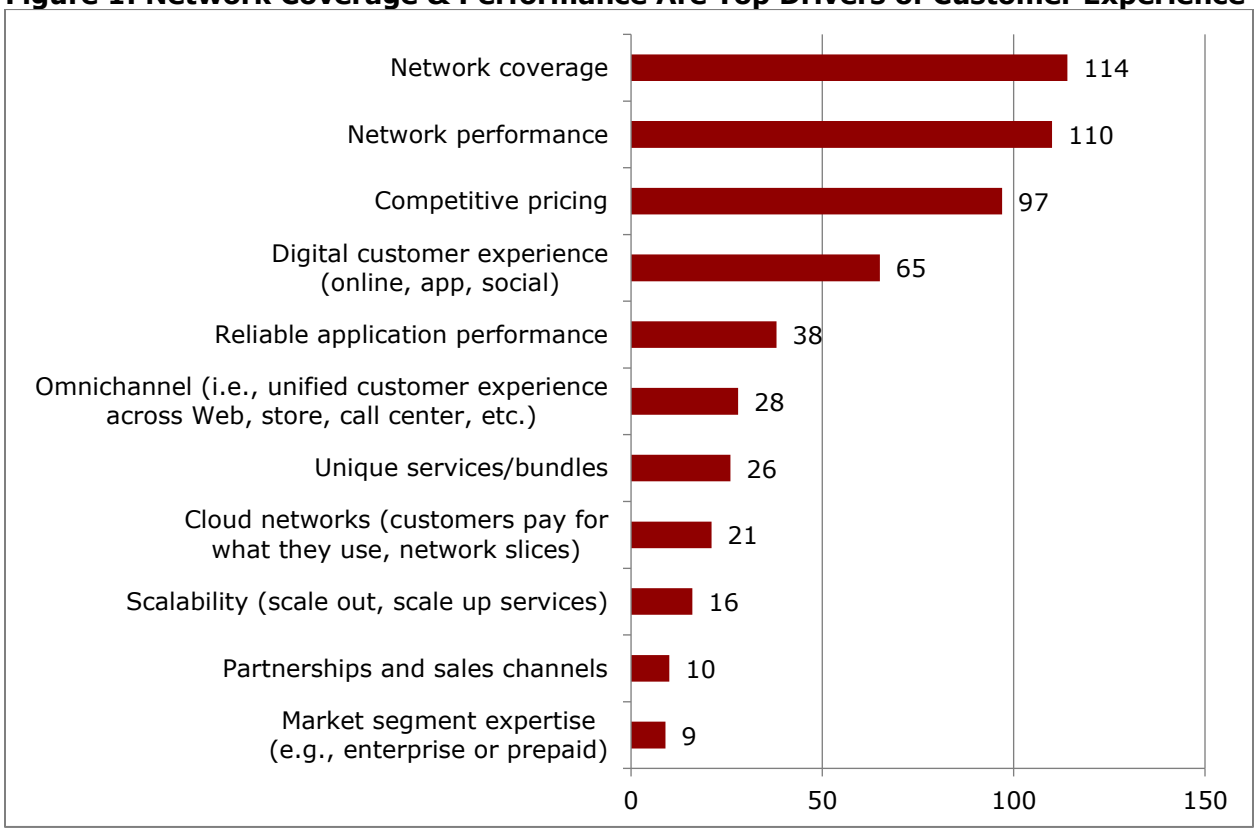
Changing Ecosystem Expects High-Quality Networks

With the growth in digital services, the ecosystem becomes more complex, and CSPs are less likely to own the whole value chain going forward. For example, in the case of third-party video content providers and Internet of Things (IoT) platform providers, CSPs provide just the connectivity, but not the software platform. This means CSPs now have to take responsibility for analyzing the performance of and assuring services from third parties – and given margin pressures, have to be far more efficient and cost-effective in how they do that.

Operators typically use network probes and deep packet inspection (DPI) software to try to understand traffic, but increasingly real-time big data analytics is needed to gain end-to-end cloud application and network visibility across increasingly high-volume and dynamic networks. Cloud technology is now making this insight more cost-effective, enabling CSPs to crunch, correlate and analyze high volumes of data from different parts of the network, service and application layers.

With the growing popularity of video-streaming apps and Internet gaming, customers expect better quality from network providers. Ongoing poor network and service performance quality not only leads customers to switch to a new provider, it also means high volumes of calls to customer care, which are expensive. According to Heavy Reading research, mobile operators widely agree that network coverage and performance is a top three driver of customer experience and loyalty, together with competitive pricing (see **Figure 1**).

Figure 1: Network Coverage & Performance Are Top Drivers of Customer Experience



Source: Heavy Reading Q4 2016 survey with 90+ mobile operators

Lack of Real-Time Network & Application Visibility

CSPs lack the network and application visibility they need to properly manage the streaming performance of cloud applications and services. Even though cloud applications and services – including Netflix, Hulu, HBO Go, Google Docs and Facebook – make up more than 60 percent of network traffic today, providers have very limited insight into which applications are running on their networks, and what impact this application traffic is having on their networks and subscribers. This can make troubleshooting a laborious process.

Intelligent analytics can help CSPs to quickly uncover root causes of network issues and locations. By analyzing traffic flows, CSPs can quickly figure out where the customer problem is – the network, the application or device? It should also be possible to drill down to network issues by location and overlay that view with other data such as Customer Experience Index (CEI) on high-value customers (e.g., enterprise customers). It could also be looking at a particular service such as video by analyzing processing times by location or other advanced filters to quickly spot the worst-performing network sites.

Leveraging big data software platforms to do multidimensional analytics at massive scale is only part of the story. Operators can also gather cloud intelligence that eliminates the need to deploy dedicated hardware devices across the network. A new approach is for analytics vendors to track every cloud service and application on the Internet so they can build a "caller ID" or service supply chain for cloud apps/services. Operators can combine data from such a feed with their own network data – in real time – to gain instant visibility of how cloud services/apps flow to and through their networks.

Real-time big data analytics are becoming essential for operations staff and economically more attractive for CSPs with the sheer growth in cloud apps and dynamic, real-time and personalized services, as well as the adoption of software-defined networking (SDN) and network functions virtualization (NFV) technologies. Another driver is the demand for network and service automation, which requires big data analytics – delivered in real time.

MANAGING CLOUD & STREAMING APPS

Integrated View of Related Cloud & Network Data Sets in Real Time

Many operators have struggled to integrate disparate data sources from the network, operations support systems (OSS), etc., to get reliable network and service quality insights. There is also limited correlation of cloud and network data. Now CSPs are starting to take advantage of big data platforms that can support real-time analytics on vast data sets to improve network and service visibility end-to-end and across different network layers and data centers, while cloud hosting and storage makes the economics of big data analytics more viable.

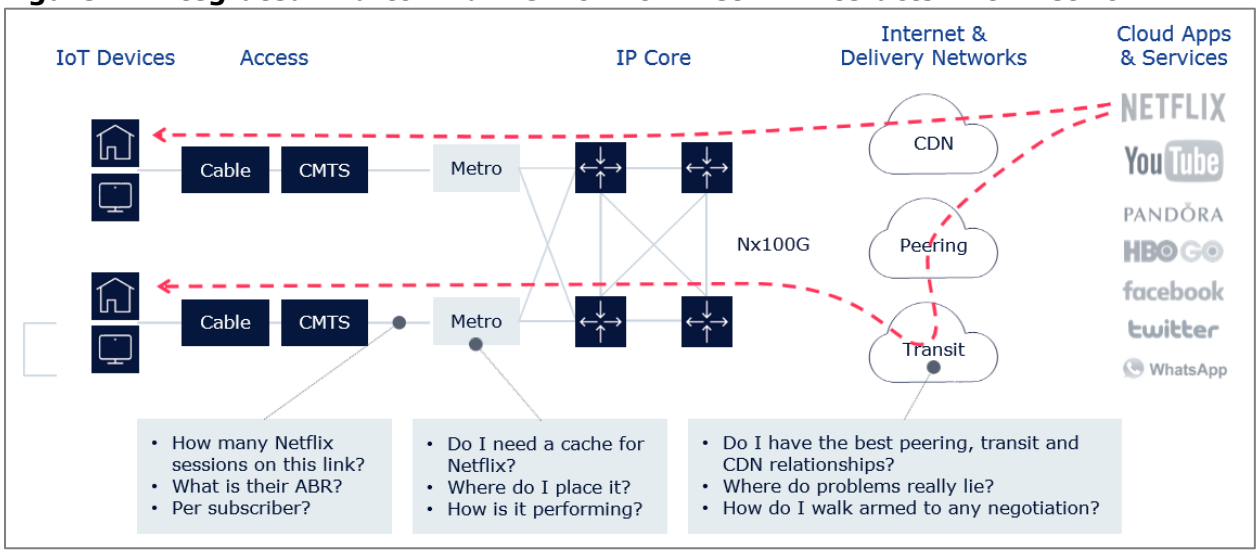
Using multi-dimensional data and analytics in real time on network telemetry data and cloud applications and services makes it easier for CSPs to optimize network performance, assure services and predict future impacts as content increases, to understand network bottlenecks for targeted network investment.

With more than 30,000 popular cloud applications and services on a typical network, tracking how this traffic runs to and through networks to reach subscribers, in real time, creates powerful, multi-dimensional views of the network and applications. For example, being able to identify the IP addresses that correspond to Netflix, as well as the caches and CDNs being used by Netflix, will allow CSPs to see where the traffic originates and where it reaches the end user. This capability will also become increasingly vital in 5G networks with low-latency applications and critical IoT services such as industrial manufacturing or real-time health monitoring.

This insight can also help network operators to launch new services, enhance network performance, understand and optimize their costs, and increase profitability. Together, they provide visibility into a network's components, costs, usage and performance – for example, the ability to look at how much Netflix traffic is running on your network, as well as how much it's costing you to deliver it.

Using virtual appliances and big data analytics platforms, a CSP can watch IP addresses to tell if a router port is passing Netflix videos – and how many, and how much bandwidth it's providing to them. That opens up network automation possibilities: If a CSP's Netflix score is dropping due to congestion, this could signal the network to divert some streams to less congested parts of the network (see **Figure 2**).

Figure 2: Integrated End-to-End View of How Netflix Interacts With Network



Source: Nokia Deepfield

VIDEO-STREAMING OPTIMIZATION USE CASES

Figure 3: Leading CSP Improves Streaming Quality With Faster Troubleshooting

Problem	Solution	Business Value
A leading CSP received a surge of customer complaints indicating that Netflix was down in one area. DPI was not deployed across the entire network, so the CSP could not locate or determine the extent of problem. Also, detecting Netflix apps took time, which impacted troubleshooting.	Big data analytics platform with real-time, multi-dimensional view of the entire network and the ability to visualize complex data. Using geo-location and impacted service data, the CSP discovered a problem on one cable modem termination system impacting 800 customers. Rebooted the exact router, and service was restored in a short period of time.	Quickly troubleshoot and restore services to customers and reduce risk of customer churn. Gain network and app visibility without high capex cost of deploying DPI probes throughout network.

Source: Nokia Deepfield

Figure 4: CSP Saves on Bandwidth & Improves Streaming With Targeted Analytics

Problem	Solution	Business Value
A leading ISP was facing many customer complaints about streaming quality in one region. It added a large amount of costly bandwidth in an area of concentrated complaints, but quality did not improve. The data provided by DPI was far from complete and did not help the ISP pinpoint exact issues.	Big data analytics platform with real-time access to unified network data sets to see traffic flows across their network. Through daily checks, detected a poorly configured cache in one location that resulted in poor streaming quality for subscribers accessing the PoP at peak. ISP also discovered that the failover cache was 1,500 miles away, further degrading traffic. The ISP reconfigured the failover cache and added the right amount of bandwidth to the exact location.	The results were reduced costs from unnecessary buildouts, increase in streaming traffic delivery speeds, greater customer satisfaction and reduced churn. The ISP continues to use the solution to make similar changes across its network.

Source: Nokia Deepfield

TAKEAWAYS

In order to deliver a consistent quality of experience, operators need visibility into how everything in the network environment is working together in real time. There is data in every layer that makes up the application or service, but existing network monitoring tools cannot tell the full story. This is especially important when it comes to real-time apps such as video streaming or Internet gaming. A CSP is at a real disadvantage if it cannot pinpoint and fix problems very quickly. A better understanding of the network and application ecosystem, the traffic mix (to and from data centers) and the real transport and operational costs are critical to meet customers' expectations of a high-quality service. With this insight, operators can start to predict bottlenecks and fix problems before customers even notice.

CSPs that deploy a fast and comprehensive network and cloud app analytics solution will have a more holistic view of the end-to-end network and app performance in the eyes of the customer. This means it can deliver a better service, lowering the risk of churn, but also, in terms of business value, do this with less capex on network equipment. A bandwidth upgrade is not always the right solution, and having reliable network and cloud insight puts CSPs in a stronger position to renegotiate contracts with content partners or wholesale partners, as well as identify new services and business opportunities much faster than before. Benefits include:

- More precise network buildouts
- Detailed cost breakdowns for billing at P95
- Real-time insights into subscribers and services, even down to the device
- Improved management of peering, transit and CDN partnerships

Once CSPs have a firm grip on network and cloud app activity with reliable real-time data, this can be an enabler and the basis for effective and growing levels of automation.

ABOUT NOKIA

Powered by the research and innovation of Nokia Bell Labs, Nokia (www.nokia.com) serves communications service providers, governments, large enterprises and consumers with the industry's most complete, end-to-end portfolio of products, services and licensing. From the enabling infrastructure for 5G and the Internet of Things, to emerging applications in virtual reality and digital health, Nokia is shaping the future of technology to transform the human experience. A truly global company, Nokia's 160 nationalities work in more than 100 countries.

Nokia Deepfield Core Platform is a big data engine/software platform that enables service providers (cable providers, cloud providers and telcos) as well as large enterprises and Webscale companies to understand their IP network with unprecedented visibility, all in one place.

Nokia Deepfield Cloud Genome is a patented map of the global service supply chain that adds visibility to all applications built onto the Core Platform.

The big data engine/software platform is the basis for Deepfield analytics applications, including Cloud intelligence that provides end-to-end network visibility, Service Intelligence that monitors customer QoE in real time and Deepfield Defender, a security application that performs real-time distributed denial-of-service (DDoS) detection and mitigation.