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How 'App QoE' can increase profitability while improving subscriber satisfaction

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Sales

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Traffic generated by OTT apps exert tremendous pressure on global networks, but an App QoE approach helps operators reframe capacity planning and network optimisation needs in the context of customer satisfaction

Network traffic generated by Netflix, YouTube, Google, Xbox, and other applications are exerting more pressure on global networks, raising capital expenditure and impacting service providers' income statements and profitability.

An App QoE (App Quality of Experience) approach to capacity planning, operational efficiencies and network optimisation can make a difference.

In 2020 and 2021, COVID-19 accelerated digitisation by years, and telecom service providers around the world rose to the challenge by ensuring their networks kept up with the wave of data traffic coming in from video conferencing, video streaming, telehealth, and virtual learning. Today, people spend as much as five to eight hours a day on applications, many of which are bandwidth intensive and video based.

In fact, *Sandvine's 2023 Global Internet Phenomena Report* showed that there was a 23% increase in overall internet traffic H1 2022 compared to H1 2021, largely due to the growing popularity of video apps like Netflix, YouTube, and TikTok, as well as interactive apps like gaming, social networking, and messaging.

Samir Marwaha, Chief Solutions Officer, Sandvine.

Photos by: Beau Bumpas

Brands	
Meta	27.82%
Alphabet	19.09%
TikTok	13.76%
Netflix	2.41%
Microsoft	1.96%
Apple	1.51%
Amazon	0.38%
TOTAL	66.93%

Figure 1:
Mobile traffic volume by brand

Figure 1 shows that 67% of all mobile traffic volume is attributable to the biggest brands, with Meta's Facebook being the biggest contributor and Alphabet's YouTube second.

Each of these brands' apps are growing in complexity, with fusions of video, audio, voice, chat, location, and payments for better engagement and more frictionless experiences. As subscribers become increasingly dependent on applications, the performance of each function within the app dictates the user's quality of experience (App QoE). This means operators are having to reframe capacity planning and network optimisation needs in the context of customer satisfaction.

We spoke to some of Sandvine's senior leadership team to get a greater insight into App QoE, and how it adds value in the following three key areas:

- **Improving customer satisfaction**
- **Planning and optimising networks to improve CapEx ROI**
- **Creating actionable data to quickly address the who, what, and where of problems affecting subscribers**

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"You want to get to the root cause of issues faster so you know whether you need CapEx, OpEx, or simply optimisation of existing investments"

SAMIR MARWAHA
CHIEF SOLUTIONS OFFICER,
SANDVINE

What is 'App QoE' and how does it differentiate you in the market?

"App QoE means understanding what your end-users are experiencing and feeling when using their favourite apps over your network.

Today, people use dozens of different apps every day. Whether for work, education, health, or entertainment, people are using apps more frequently, and across more devices, too. There is such an increasing dependence on apps, in fact, that subscribers' App QoE matters more and more.

Regardless of device type, access method, or subscriber location, App QoE is a reflection of your network. This means you have to better analyse and optimise networks to deliver the best possible quality of experience to subscribers and enterprise customers. You want to get to the root cause of issues faster so you know whether you need CapEx, OpEx, or simply optimisation of existing investments.

This is why real-time measurement of App QoE is so important. Advanced machine learning (ML) drives our application classification and quality of experience "scoring", with greater than 95% classification

EXECUTIVE BIO

SAMIR MARWAHA

TITLE: **CHIEF SOLUTIONS OFFICER**

COMPANY: **SANDVINE**

INDUSTRY: **TELECOMMUNICATIONS**

LOCATION: **TEXAS, US**

Samir Marwaha leads Strategy, Corporate Marketing and Product Management. He evangelises an App QoE approach to best data that is currently missing from all network and service performance systems. This data is essential for network operations, capacity planning, heavy usage management and executive insights to drive profitability and subscriber satisfaction.

Traffic Categories	
1	Video
2	File Sharing
3	Television
4	Social Media
5	Web Apps
6	Device Gaming
7	Communication
8	App Store
9	Audio
10	VPN
11	Cloud Gaming
12	Conferencing
13	IoT
14	Infrastructure

Figure 2:
Traffic Categories

accuracy across 14 categories of traffic [figure 2] and 11 categories of content. In other words, we bring a clear and comprehensive application-specific view of what's hidden in service providers' data and control planes, tracking flows across entire delivery systems in networks.

What we do is different from the big network equipment manufacturers, probe companies, and application performance monitoring vendors. We offer more depth and scope because we are application focused, with extremely good data analysis and insight into what is going on in both the data and control planes, tracking the flow across the entire delivery system in the network.

Our machine-learning app classification takes place in the data plane, while in the control plane, data enrichment and QoE scoring occurs, feeding visualisation of the designated KPIs related to App QoE. This streamlines and accelerates operational analyses and actions. [figure 3]

In this third layer, we offer custom application workflows that deliver persona-specific visualisations for the CTO, operations, network planning, big data, and even marketing. The custom dashboards enable:

- CTOs to benchmark their network performance and plan network improvements based on application usage to maximise ROI.
- Operations to troubleshoot application problems quickly, before they become customer service calls or truck rolls.
- Network planners to be more precise and prescriptive so that congestion is managed and QoE is optimal over the long term.
- Big data teams to analyse all data traffic, including encrypted data, so they can make better business decisions.
- Marketing to monetise data traffic, upsell to specific users, and increase advertising revenue.

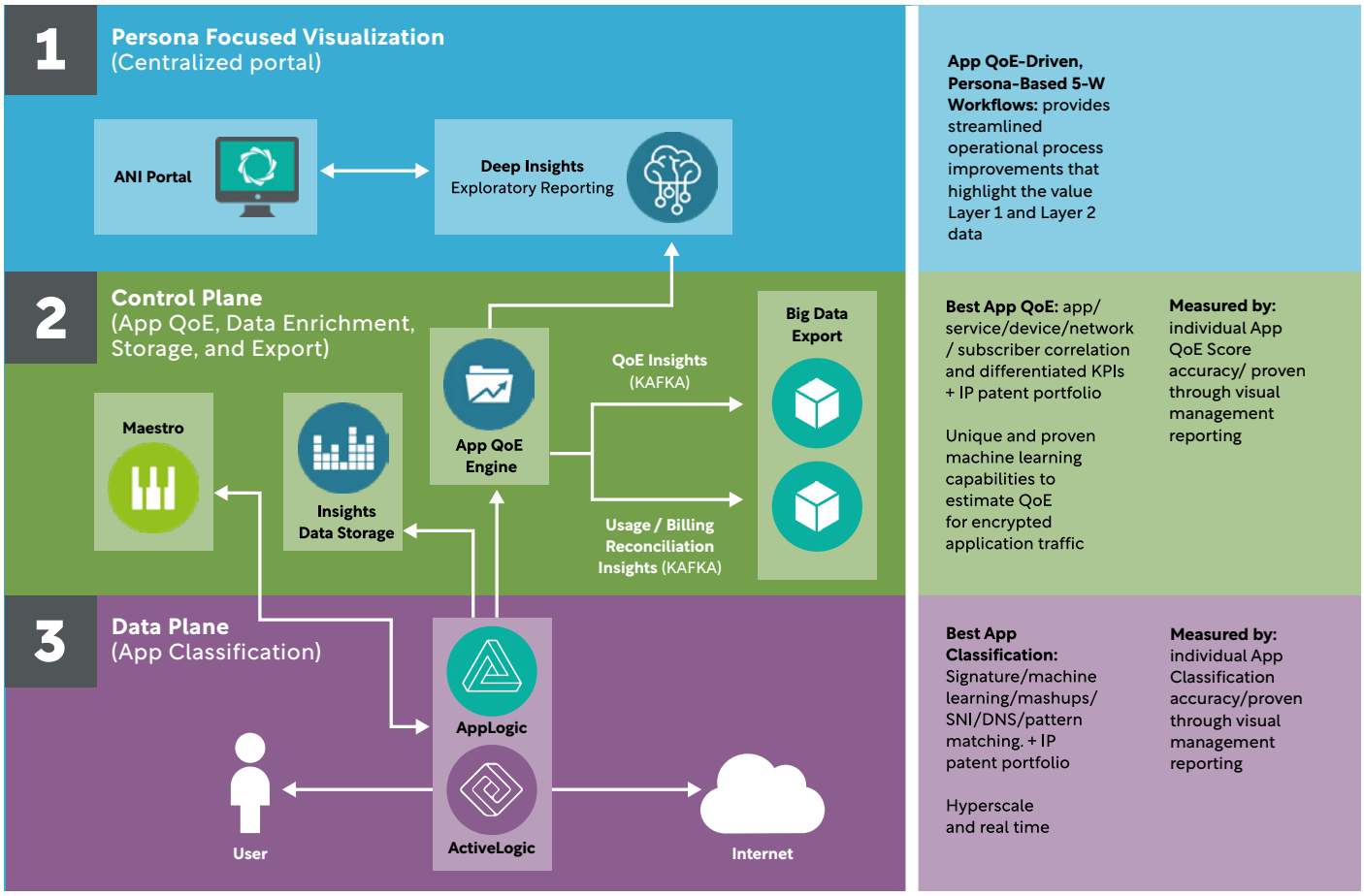

Figure 3: Sandvine's Portfolio – Delivering Value at Each Layer

"Get capacity in at the right time because if you get it in too late, users suffer; if you get it in too soon, you waste CapEx and OpEx"

ALEXANDER HAVÄNG
CHIEF TECHNOLOGY OFFICER, SANDVINE

App QoE for right-time capacity planning

It's important to get the timing of upgrades right. Capacity planning has a significant impact on everything – co-work capacity, access capacity, distribution networks, caching networks, peering links and small CDLs. CapEx also has a huge effect on OpEx, so timing is everything.

To stay ahead of utilisation, operators across the board want to be able to predict what's going to happen over their networks, but fixed and mobile operators have different needs: fixed operators never want to be "full", so once a port hits 50% or 60%, they schedule an upgrade.

EXECUTIVE BIO

ALEXANDER HAVÄNG

TITLE: **CHIEF TECHNOLOGY OFFICER**

COMPANY: **SANDVINE**

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LOCATION: **SWEDEN**

Alexander is one of the founders of the company and a lead architect of Sandvine's Application and Network Intelligence and App QoE solutions. Alexander's passion for problem solving makes his role very customer-facing, working with service providers to understand the qualitative experience their subscribers are feeling with applications, and deploying solutions that improve customer satisfaction and improve CapEx ROI for operators.

But the time between the decision and the upgrade can be very long, sometimes "years" long. By then, customers might be upset and going elsewhere.

Mobile operators are a bit more constrained, because it's very cost prohibitive to fix a problem if utilisation hits 100% on a radio node. So, they typically look at how much bandwidth a subscriber gets on a particular radio node in a certain location, and, if it goes below a certain throughput, they schedule an upgrade, that involves capacity elements like interfaces, radio equipment, switches, ports, routers.

Alexander Haväng
Chief Technology Officer, Sandvine.
Photos by: David Pahmp

In both cases, the best thing is to defer CapEx until you know it's the perfect time. But monitoring utilisation on a port doesn't give adequate information about when the port will hit 100%, or in a mobile network, when subscriber bandwidth will drop below something like 3 mbps.

Sometimes, to make an operation profitable, you can run an interface hot rather than going for a full interface or upgrade. If you see a streaming video experience goes from "awesome" to "very good" at a certain level of utilisation, you don't necessarily have to upgrade.

"Sometimes, to make an operation profitable, you can run an interface hot rather than going for a full interface or upgrade"

ALEXANDER HAVÄNG
CHIEF TECHNOLOGY OFFICER, SANDVINE

What's needed is accurate and precise forecasting, and our solutions are designed to provide more visibility, such as:

- What is driving utilisation? Are you acquiring more subscribers in a certain location? If there's not much subscriber growth, do you have a lot of movement, like people moving among states or countries? Are a small percentage of users eating up most of the network resources? Do you have 1% of users eating up 10% of resources, or maybe 10% of users eating up 50%? Or is there, perhaps, a device issue, like a new security camera defaulting to 4K and eating up people's plans without them knowing? Is there intentional fraud like tethering or video in VPNs that needs to be evaluated for disproportionate or heavy usage?

- What's the "application popularity"? Meaning, how many subscribers at peak are using heavy video applications and how much and what type of video is being used? Is it Netflix or YouTube, is it 4K or 1080p?
- How much bandwidth does each application session use? Is the session video, gaming, or social networking, and which apps within each category are consuming the most bandwidth. How is this affecting other customers' App QoE?
- Answering each question helps predict how much growth there will be in a particular node. Then what-if analyses can take place to inform planning for different scenarios: if you have 5% more subs, or if Netflix changes throughput for a video from 1080p to 4K, or if 20% more videos will be 4K, what can you do? Down the road, what happens if 10% more people are on metaverse, or if cloud gaming takes off and 5% of my users are at 50 MB each?
- The answers to these questions lie in the data. The quality of the data, the ability to manage and enrich data with context, and to share the data among systems relevant to App QoE is the critical foundation for decision making.

"You start to have real power when your data can inform what will happen in the future"

AMBUJ MITTAL
CHIEF DEVELOPMENT OFFICER, SANDVINE

EXECUTIVE BIO

AMBUJ MITTAL

TITLE: **CHIEF DEVELOPMENT OFFICER**

COMPANY: **SANDVINE**

INDUSTRY: **TELECOMMUNICATIONS**

LOCATION: **KARNATAKA, INDIA**

Ambuj Mittal brings more than 20 years of experience specialising in telecom networks and mobile devices. He is responsible for the research and development of Sandvine's App QoE-focused products and solutions, driving advanced classification and categorisation to help service providers predict, plan and invest in their networks with forethought and precision. He has extensive experience in leading organisations focused on innovation and delivering world class products for the global communication service provide market and has expertise in transforming technology into market driven business outcomes.

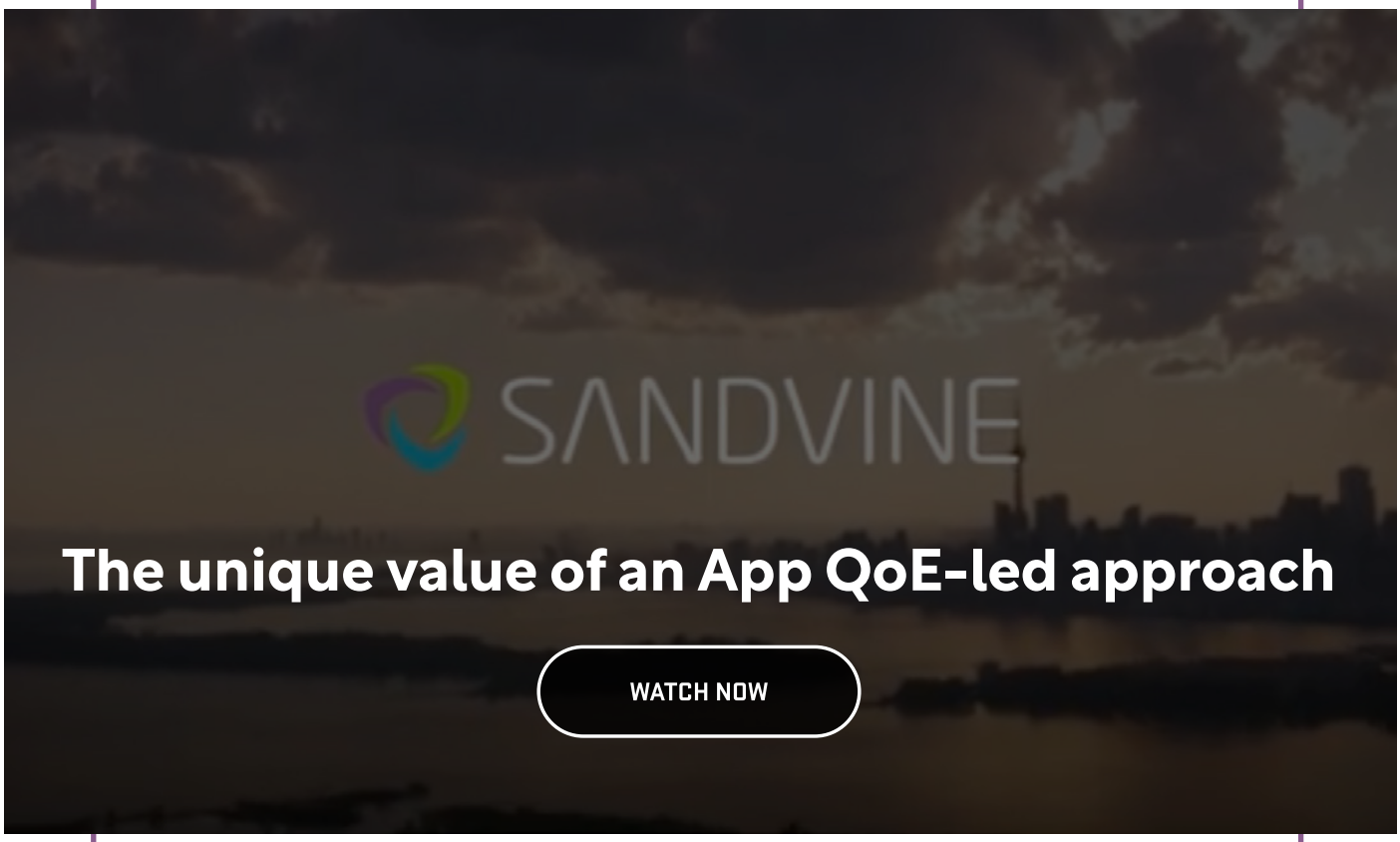
Data creation and utilisation for actionable insights

There is a massive amount of data in each call going through the network. Raw packets embody different stages of a call and contain different aspects of the overall App QoE. For example, if you're on a Zoom call, each person's experience will differ depending on how data flows from the client to the Zoom servers in different parts of the world, and back again – and all over different devices.

If we have an issue with poor audio or an inability to share a screen, we blame the underlying network. It could be the underlying network, or it could be many other variables, but it will be the network operator's brand that is first impacted. That's why creating good, quality data is crucial to the type of insights you need for meaningful corrective actions to take place.

Ambuj Mittal,
Chief Development
Officer, Sandvine.

Photos by: M John Benniel



There are four steps to uncover and deliver meaningful data:

- **Step one:** Classify the app data. You have to classify that data to recognise which app is generating that data.

- **Step two:** Categorise the content. With many categories of apps, you might have video, voice, chat, and gaming content all in the same flow. For example, Uber is not a single app but rather a series of apps, such as Uber, UberEats, Uber Freight, Uber Same-Day Package Delivery, Google Maps, 3rd-party geolocation services, GPS tracking, and payment services. With Netflix, you may stream a movie or download a movie while simultaneously browsing content. To understand the application, you have to "look under the hood" to categorise the traffic and the content within the app.

- **Step three:** Identify the context – who, what, and where. Who (which subscriber) is driving on what access network and device, and where is that subscriber? Within the same packet of data, and same flow, you can get different contexts that can further enrich the data, deriving more meaning from the data. For example, if a person is having a poor experience, and they are paying for 2mbps rather than 10mbps, then is there a way to better match the subscriber to the best plan for his/her usage?

- **Step four:** Score the QoE. Within the identified context, the score articulates the QoE is delivered by that data to that subscriber. The insights we deliver help telcos know if the App QoE is satisfactory for each subscriber on the network.

"By planning networks around QoE rather than throughput, operators no longer have to continuously throw endless capacity at problems. Instead, it's possible to predict, plan and invest with forethought and precision"

AMBUJ MITTAL
CHIEF DEVELOPMENT OFFICER,
SANDVINE

Operations can use quality data insights for troubleshooting, isolating issues and resolving them according to the actual problem. Capacity Planning or Network Management, meanwhile, can see if the network is congested and whether adding capacity is the solution, or whether just optimising what is already there is the answer.

By planning networks around QoE rather than throughput, operators no longer have to continuously throw endless capacity at problems. Instead, it's possible to predict, plan and invest with forethought and precision. Segmenting the traffic and identifying whether problems are due to the network or something else, allows you to take action more rapidly. For example, if an OTT provider is experiencing server problems, you can proactively let customers know so that your call centres don't get flooded with complaints and your customer satisfaction scores don't suffer.

To summarise, the "right time" deployment operators want to start with a foundation of good, quality data. Knowing what will happen helps you automatically take action based on predictions. It's one thing to know history, but another to know what to do now and into the future.

You start to have real power when your data can inform what will happen in the future – and being able to take that action without human intervention is what gets you to automation. Proactive automation then gets you to intelligent networks that automatically respond to what's happening in real time.

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