RADCOM

RADCOM
Network
Insights

Introduction

RADCOM Network Insights delivers business critical intelligence to the operator by providing a complete 360° view of the customer and service experience. RADCOM takes the raw data from the RADCOM Network Visibility and RADCOM Service Assurance layers and converts it into rich actionable insights offering business critical intelligence to the operator.

Having a complete end-to-end view of the service quality enables the operator to have a full understanding of the customer experience, from services they are utilizing to how they are experiencing the network. Using this intelligence, operators can prioritize customer affecting issues, recommend corrective actions, and rapidly troubleshoot any performance issues using deep call-tracing and protocol analysis tools.

Covering a wide range of use cases from roaming, video optimization, data monetization and churn prevention, RADCOM Network Insights correlates the network intelligence into revenue generating business insights for multiple departments across the organization such as engineering, customer care, Network Operators Center (NOC), Service Operations Center (SOC) and Customer Experience Management (CEM).

For SOC and CEM, RADCOM takes the raw data from the network (RADCOM Network Insights) and correlates it with additional data sources (from BSS & OSS) through RADCOM Smart Mediation. This provides operators with an end-to-end view of the service quality and customer experience while enabling troubleshooting at a per customer/device/session level.

RADCOM SOC Solution

Smartly correlating RADCOM Network Insights with BSS and OSS data sources

RADCOM's SOC solution enables operators to smartly monitor the overall service quality and take actions to rectify service degradations that impact subscribers by monitoring the Key Quality Indicators (KQIs), and Key Performance Indicators (KPIs) as defined in conjunction with the operator.

The SOC solution takes in numerous data sources from RADCOM Network Insights to OSS data (such as Performance Management, Fault Management, Trouble Ticketing Systems, Call Trace Records and Inventory), as well as BSS data (such as Billing and Customer Relationship Management - CRM).

The data is then correlated via RADCOM Smart Mediation to calculate the KQI's and KPI's, triggering alarms when service quality drops below a certain threshold, or when there are anomalies in the data. Taking an end-to-end view of the network ensures that rapid action is taken when there is any degradation or outages which may affect the subscriber.

For operators to deliver a comprehensive, end-to-end view of the service and customer experience, they need to utilize probe-based data as the foundation of their SOC solution that is then enriched by the OSS and BSS data. Deploying a probe-based SOC and CEM solution offers a number of advantages to the operator.

By utilizing probes, the operator is able to perform troubleshooting drill downs from an aerial view of the network right down to a single transaction or network packet. This means the operator is able to analyze and troubleshoot traffic on a per customer, per service, per network element or session level.

So, deploying a probe based SOC solution helps operators prioritize network issues based on their impact on the customer, troubleshoot the root cause and delivers suggestions for next best actions.

> " At the heart of SOC is the ability to prioritize troubleshooting and root-cause analysis on network issues that most significantly impact the customer experience "

Anil Rao,
Principal Analyst, Automated Assurance and Service Design and Orchestration.
Analysys Mason

RADCOM CEM

Correlating RADCOM Network Insights with BSS and OSS data to generate a Customer Experience Index (CEI)

RADCOM CEM enables operators to smartly monitor the entire customer experience journey with easy access to end-to-end troubleshooting, trend analysis as well as churn and Net Promoter Score (NPS) prediction. With RADCOM CEM operators can improve customer retention, reduce OPEX, and differentiate their customer experience.

Enabled by correlating multiple data sources (such as RADCOM Network Insights, RADCOM SOC as well as BSS and OSS data sources) RADCOM generates a Customer Experience Index (CEI) that lets operators understand the perceived user experience.

By correlating data from multiple touchpoints, the operator can truly understand the customer experience and troubleshoot the service performance to ensure the delivery of high-quality services to their subscribers.

Taking a comprehensive view of the customer experience and breaking down silo's by ensuring different departments are communicating effectively is a critical part of bringing the customer into the center of the solution.

The CEI calculates the customer's satisfaction levels though correlating multiple parameters which can be defined by the operator.
These can include, but are not limited to;

Product experience

Bill satisfaction

Customer service experience

Complaint handling experience

For more information on RADCOM SOC and CEM solution visit:
https://www.radcom.com/customer-and-service-experience-management

Proactive Customer Care

Maintaining a high level of customer service has never been more important, and as subscriber ARPU's have leveled out, operators need to find new ways to differentiate themselves. To deliver a superior customer experience, operators need to take proactive actions to repair any network issues before the customer is even aware of them.

In order to deliver services as the customer expects, operators must take a proactive stance in assuring, and continuously improving, the service levels and overall QoE. This also applies to any premium services being utilized by the client, such as VOD, VoIP, LTE, VoLTE, and in the coming year, 5G.

RADCOM Network Insights is a powerful combination of probe-based data from RADCOM Service Assurance and RADCOM Network Visibility, keeping a constant eye on the network ensuring a VIP service, to a range of devices, at all times.

The solution will automatically trigger actions for resolution if the service quality drops below a pre-defined threshold so the operator can take proactive steps to resolve the issue before they affect the VIP.

Using the insights provided, the operator can understand which apps and services receive the heaviest usage and concentrate

efforts in ensuring a continuously high level of service. This consistently high QoE fosters the loyalty of the VIP. Operators can capitalize on this by influencing brand perception, which in turn will contribute significantly to revenue streams.

The smart probe-based solution enables operators to analyze and troubleshoot traffic on the fly, per customer, service, or session.
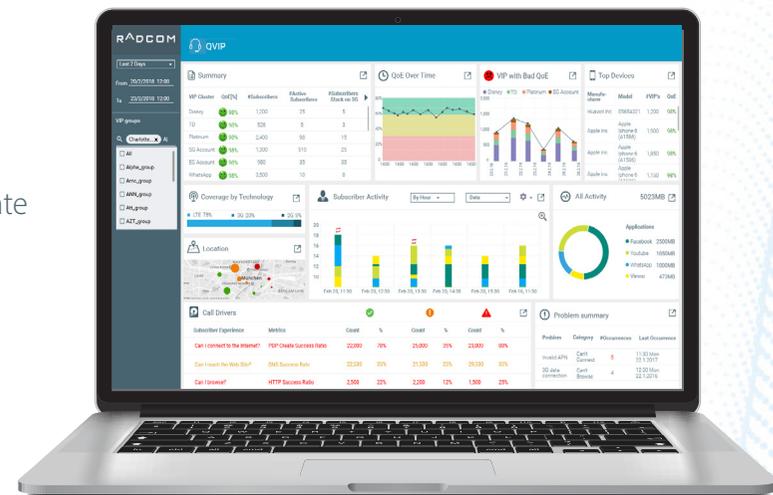
Roaming

Operators have the potential to generate significant revenues from subscribers who are roaming both in and out of the network. By aggregating both control and user plane information for all subscribers, the operator is able to detect connectivity issues for both inbound and outbound roamers.

RADCOM's Roaming Assurance application periodically monitors the roaming KQI's and generates threshold crossing alarms, retrieving the cause of the failed connection and highlighting them clearly in the intuitive dashboard. If the subscriber is a VIP, this is also highlighted, enabling the operator to prioritize based on the customer experience. Next, best actions are suggested based on a preconfigured rule set and escalate to the network troubleshooting team.

Gaming

Gaming requires a premium internet connection and adds value to the operators' content offering. So, as these operators move to virtualization and 5G, they will be able to offer customers a consistent and predictable Quality of Service that guarantees low latency.

To ensure this service offering, operators will need to have a dedicated assurance offering that monitors these requirements, assures the network, and delivers on the demanding gaming SLAs.

Encryption adds a further challenge for operators as much of the gaming traffic is encrypted and therefore difficult to monitor.

Using machine learning and heuristic modeling, RADCOM is able to detect patterns in the data, setting KQI's and enabling visibility for the operator where it was previously a blind spot.

RADCOM can monitor and analyze the service experience segmenting via, location, network element, application, device, VIP groups, and roaming partners to provide a quality experience for gamers.
The end-to-end view enables the operator to pinpoint areas or

individuals who are experiencing poor latency and perform drill downs with troubleshooting on-the-fly.

Operators will also be able to identify which are the top gaming applications and target customers, accordingly, opening up new revenue streams alongside plans for guaranteed latency levels.

Tethering

Many smartphones and PC devices connect to the internet via a host device. For mobile networks, this could be a hotspot or smartphone. For fixed line broadband this would be via a WiFi router, and there may be other devices connected via a Wi-Fi or Bluetooth connection. The challenge for operators is to understand how many devices may be tethering to the host device so that they can gauge the volume of traffic being carried through tethering.

RADCOM employs machine learning and heuristic modeling, helping to identify where the traffic is originating from, and what type of traffic it may be, whether mobile, fixed line, or Wi-Fi/ Bluetooth.

The operator can then tailor the solution to the user behind the tethering device and offer them a personalized plan to encompass their needs. In addition, operators can see which Over-The-Top (OTT) applications are being used to tether, providing further insights on what demands are being placed on the network and customer usage patterns.

RADCOM's tethering solution offers insights for a single subscriber including when they activate tethering, the number of tethered devices, total data, session duration, speed and the Quality of Experience (QoE) for all tethered devices.
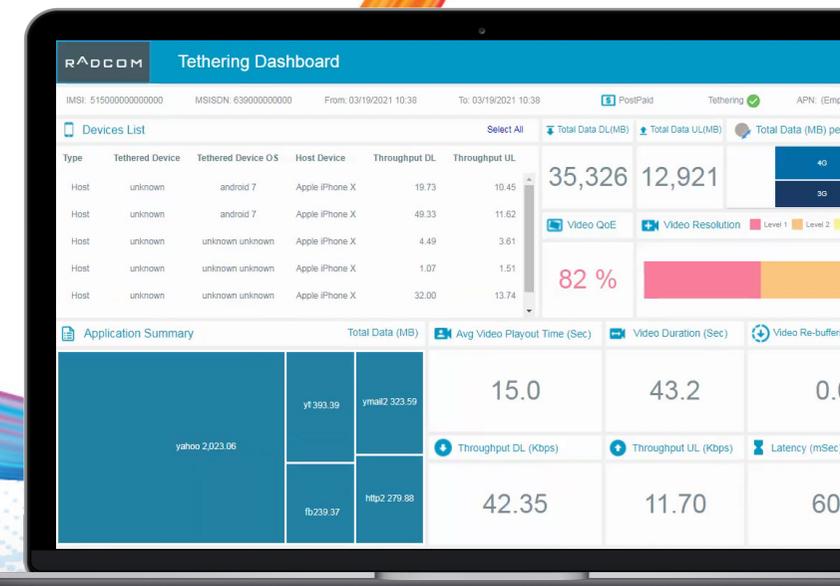
Video Streaming

It is estimated that by 2021, video services will account for 82% of all the traffic on the internet. With 50% of all video data being encrypted and the expectation that this figure will rise, operators are facing the challenge of extracting insights from the network and understanding the customer's QoE.

Operators are also recognizing that video streaming is a potential area for growth and want to be able to offer their own streaming platform, which they can monetize and sell alongside existing video streaming services. However, in order to be able to offer and monitor these services, the operator must gain critical insights into an area that is almost entirely encrypted.

RADCOM deploys cutting-edge machine learning and heuristic modeling to develop algorithms which are powered by mass video streaming samples. These offer insights into the KQI's relating to starting delay, rebuffering indication, the frequency and the duration of the rebuffering, the video resolution and the duration of each of the four resolution levels, and the total bytes of effective video throughput.

This is then calculated and represented in a score from 0-5. Using these insights, operators can gain visibility across encrypted networks and understand the QoE being delivered to the customer.

IoT

As the number of connected devices continues to increase, Ericsson, in its latest mobility report predicts growth from 1 billion devices in 2018 to 4.2 billion in 2024. Operators hope to become significant players within this market by offering end-to-end IoT platforms to enterprise customers, municipalities, and governments.

The operators provide device connectivity as well as application platforms to manage the whole solution. This generates value for industry customers, and the operators can acquire higher revenue streams. However, as operators offer this as an end-to-end solution, they also need to assure that connectivity is maintained, and SLAs achieved.

RADCOM Network Insights displays real-time intelligence on the behavior of the network, highlighting any issues in connectivity. The operator can then drill down to a specific device or location, pinpointing the root cause of any network issue, ensuring smooth connectivity and maintaining SLA's. Using machine learning, RADCOM will be able to identify baselines per device which will help in the detection of significant anomalies.

Anomaly detection is crucial for IoT as if a device fails to connect it is unable to notify the operator as a regular

subscriber would. Therefore, analytics must be used to detect anomalies per device, or group of devices, monitoring the machines on the network and catching errors as quickly as possible.
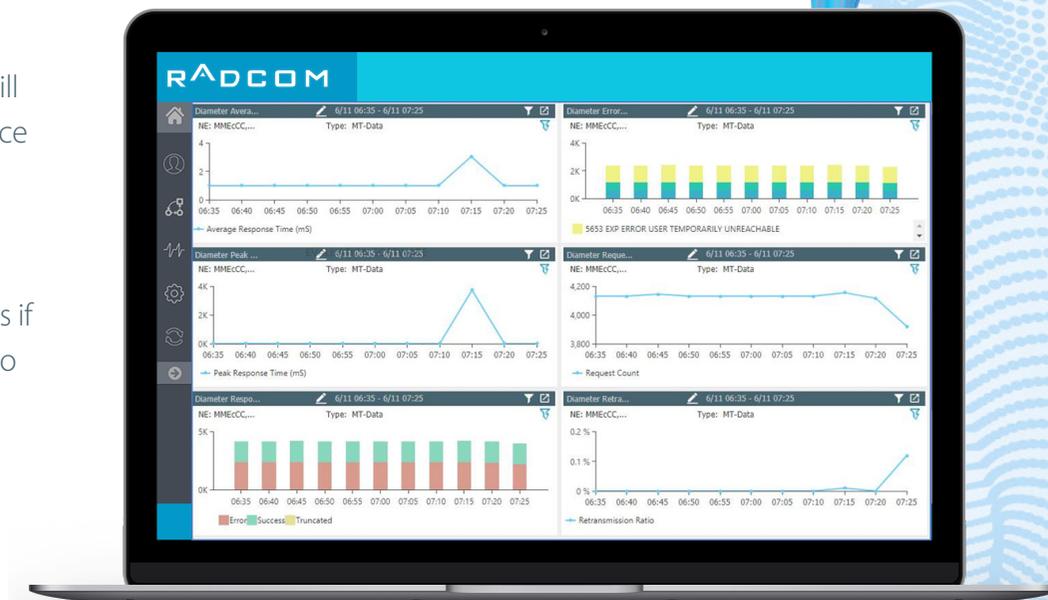
Special Event Assurance

During special events with crowded locations, subscribers may experience difficulties accessing, uploading to, and downloading from the network. This may cause a customer to complain about service degradation and poor upload throughput in certain locations.

The operator can take a proactive role by retrieving KPIs for cells in selected locations and comparing them to the KPI thresholds, combining with external feeds such as alarms and RAN.

RADCOM Network Insights can then retrieve the failure causes for the KPIs falling below the predefined threshold and suggest next best actions according to a preconfigured rule set.

The operator is also able to drill down to the CDR viewer and export the signaling and RAN data for the network troubleshooting team, enabling a crucial end-to-end view of the network and ensuring that service is restored as quickly as possible.
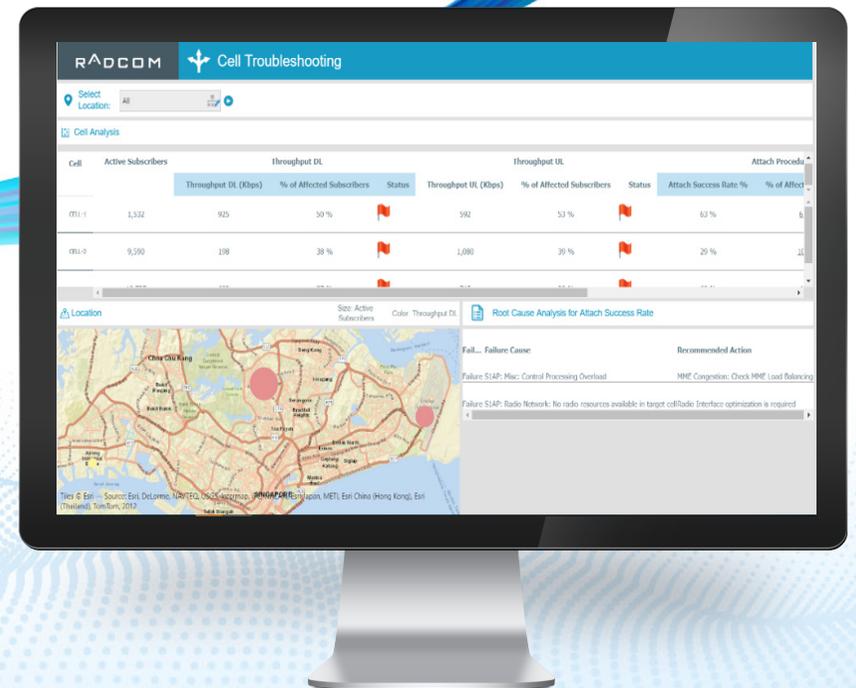
Highway Mobility

The number of connected devices is growing at an exponential rate, and customers want to be assured a smooth connection for audio and video services, even when they are on the move.

RADCOM Network Insights is able to deliver smart insights into the service quality across the entire customer journey. So, operators have complete analysis for their subscribers across multiple cells and difference service measurements.

Ensuring a consistent quality service when subscribers are moving around is a major challenge for operators who want to detect if there is poor service around specific cell towers or lesser coverage in certain regions.

Looking ahead to when there will be connected vehicles on the road, assuring a strong connection between the vehicle and the network with ultra-low latency will be crucial for the safety and success of the vehicle.

Additionally, highway mobility experience can refer to mobility gear optimization. This is based on data relating to surrounding traffic, improving the driver, and passenger experience. The vehicles will also be able to feedback information to a central point regarding their journey and the conditions on the road, providing insights on the move and up-to-date insights for end-to-end journey coverage.

RADCOM's intuitive dashboard will display KQI's segmented by vehicle, road, and overall market view. This will help the operator identify problematic cells or vehicles in addition to offering tailored packages to those customers who are frequently on the road and require a strong network connection. Having these insights will improve the service delivered and overall customer experience.
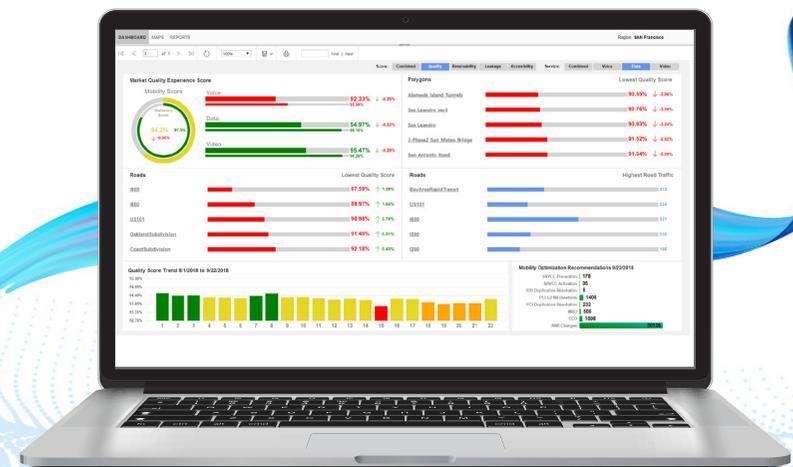
DPI

With 50% of all network data currently being encrypted, and data privacy a high priority, the trend looks for this to increase, leaving operators in a blind spot as to the subscribers QoE. Operators, therefore, need to adopt a heuristic approach with machine learning to gain insights into the network quality.

Deep Packet Inspection is another method used to help gain insights into the traffic on the network. RADCOM uses multiple technologies, including heuristics and statistical analysis to classify and detect traffic, allowing the operator to understand which applications are sending the data that is traveling through the network.

RADCOM's Enhanced DPI engine is fully integrated and embedded within the software engine. The DPI engine is able to identify with high classification granularity which services (audio, video, chat, file transfer) are being used for popular OTT applications, such as WhatsApp, Skype, BitTorrent, Viber, YouTube, etc., as well as distinguish between services. By utilizing signature mapping for DPI analysis, RADCOM is able to provide TCP based quality metrics for the QoE giving the operator key insights into the network, which applications are being used and how the traffic is flowing through the network.

Fixed Broadband

In today's always connected world, most homes and offices use ADSL for high-speed internet connection at a fixed location. These are typically unlimited plans and provide the constant connectivity required. OTT applications will be run over an internet connection, whether that is through a PC, smart TV, mobile or other connected devices.

However, many of the OTT applications are encrypted, and operators, therefore, struggle to understand realistic QoE metrics.

RADCOM Network Insights has event-driven notifications for connection issues and allows the operator to perform drill-down troubleshooting right down to an individual packet. The Fixed Broadband solution uses a Data vProbe and a processing backend for creating aggregations and CDR streaming. This is then displayed on an analytics dashboard and generates reports which offer recommendations for the next best action.

RADCOM Network Insights determines and isolates subscriber issues and troubleshoot a user or control plane problem. Using these critical insights, operators can ensure they are meeting their SLA's and achieving high levels of customer satisfaction.

Network Troubleshooting

With the introduction of new technologies such as NFV and 5G, it is critical for operators to have low-level tools in which to focus on troubleshooting the new network infrastructure.

RADCOM provides operators with next-generation tools in which users have access to data from across the entire network, which can be used to view call traces and then drill down and troubleshoot at the packet level. When there is an issue on the network it is crucial that engineers can drill-down and troubleshoot with pinpoint accuracy.

In order to do this, operators need to use a call tracing application that provides a correlated, end-to-end view of the call or data session, which is used for root cause analysis.

RADCOM is able to provide insights on any designated call or group of calls and shows the real-time picture as well as the historic view, delivering the end-to-end view of the customer's experience. With effective call tracing, the operator is able to see calls or transactions as they happen, view detailed call data, define queries quickly, and follow the changes in an open call. Session traces can be run immediately or be scheduled ahead of time.

Working alongside the call tracing is a protocol analysis application which monitors all packets passing through the network for any selected subscriber or period and can produce a full user-plane PCAP trace that can perform in-depth troubleshooting. Operators can filter

protocol data separately, or in conjunction with a network element ID, transport layer parameters, protocol types and additional filters, ensuring the precise data are extracted from the source.

Using this data, in-depth analysis can be performed to generate business critical insights and ensuring fast, and effective troubleshooting is performed on any problematic network elements, creating an improved network.
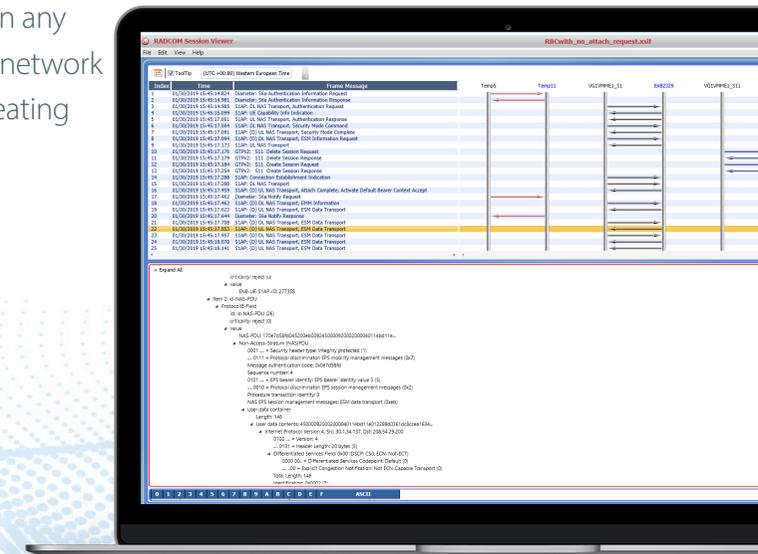
Conclusion

RADCOM Network Insights uses data from both RADCOM Network Visibility and RADCOM Service Assurance to provide rich, actionable insights for multiple use cases and departments across the organization (engineering, customer care, Network Operations Center, Service Quality). By correlating RADCOM Network Insights with various data sources using RADCOM Smart Mediation, RADCOM SOC and CEM provides operators with a modular and cost-effective solution to understand the customer experience and troubleshoot service performance.

To provide insights into encrypted traffic, RADCOM utilizes cutting edge technologies such as machine learning and heuristic modeling. These technologies are deployed to find and recognize patterns in the network traffic that build up an understanding of the quality of experience. Once these patterns are understood, machine learning develops algorithms that enrich the operators KQI's and further enhance the operator's ability to understand the customer experience even when traffic is encrypted.

RADCOM Network Insights delivers a smart end-to-end view of the overall user and service experience, enabling operators to deploy a customer-centricity approach to service assurance that will boost the end-to-end service quality while increasing customer satisfaction and brand loyalty.

> " As CSPs introduce new networking and cloud technologies such as NFV, SDN and edge computing, and embark on the 5G journey, CSPs must not lose sight of the importance of delivering superior customer experiences "

Anil Rao,
Principal Analyst, Automated Assurance and Service Design and Orchestration.
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