

Beyond QoS: Why QoE is the Future of Internet Performance Monitoring



The growing dissatisfaction with Quality of Service (QoS)-based SLAs as an indicator of network performance has led to a shift towards Quality of Experience (QoE) metrics. QoE is a user-centric approach that takes into account how the end-user perceives the network's performance rather than whether technical metrics meet predefined thresholds.

This paper reveals how Aprecomm has developed an innovative, patented application-aware engine that dynamically prioritizes real-time needs to deliver an exceptional experience to broadband consumers.

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QoS to QoE: The Paradigm Shift

For years, network providers relied on QoS metrics such as bandwidth, latency, jitter, and packet loss to measure and optimize network performance. While these metrics are crucial for maintaining technical network efficiency, they often fail to reflect the user's experience on their connected device or application. For today's internet users, just meeting Service Level Agreements (SLAs) is not enough.

They want more. Notwithstanding the exponential size of the subscriber base and the scale of operations, there is the expectation of seamless, high-quality network services to meet user demand at all times.

Inadequacy of QoS as a Performance Evaluation Metric

Traditional network management prioritized SLAs, but it is becoming increasingly clear that this does not guarantee a seamless user experience. In the real world, users often face issues that a service provider could fail to detect. These issues could be:

- Video streams that technically receive sufficient bandwidth but still experience buffering.
- Online games that meet latency SLAs but have unpredictable jitter, causing lag.
- Video conferencing applications that experience packet loss, leading to pixelation and dropped audio.
- Cloud applications that become unresponsive due to network congestion despite meeting SLA metrics.

Focusing purely on QoS metrics risks overlooking real-world issues faced by end-users and losing customers. ISPs need to consider how best to address this and proactively transition from pure QoS metrics to integrating QoE parameters into their network strategies to survive in the market.

"There were almost 1.6 billion fixed broadband subscriptions across the globe in 2024. More than half of these were in the Asia-Pacific region, where the number of subscriptions increased around almost 11 percent compared to the previous year." (Statista)



QoE as the Differentiating Value Proposition

As competition among Internet Service Providers (ISPs) intensifies, QoE is gaining ground as the key differentiator. Leading with broadband speed alone no longer makes for a differentiated strategy. Higher bandwidth speeds are available for everyone, shifting potential service or experience bottlenecks to the home instead of the access network. Since consumers have multiple options for internet services, any noticeable degradation in user experience, such as video buffering, lag in gaming, or dropped video calls, leads to customer dissatisfaction, resulting in churn and negative reviews, directly impacting the provider's business.

With high enterprise dependence on cloud-based solutions, video conferencing, and AI-driven workloads, businesses also risk lost productivity and revenue when the network fails to deliver, making them more likely to switch providers in search of better reliability and performance.

"There are 35,844 Global Internet Service Providers businesses as of 2024, an increase of 7.9% from 2023." (IBISWorld)



The Nudge for Out-of-the-Box Thinking

An ISP's focus on maximizing technical parameters such as bandwidth, latency, jitter, and packet loss to justify the quality of internet connectivity worked when internet usage was largely centred around basic web browsing, emails, and file downloads.

However, with evolving usage patterns dominated by high-bandwidth, low-latency applications like video streaming, online gaming, and real-time communications, a one-size-fits-all QoS strategy is no longer sufficient.

There was a disconnect between the service ISPs provided and the actual QoE perceived by end users. There was an overarching need to identify this gap, quantify the deviation, and develop a targeted solution to bridge it effectively.

Gaining Visibility Into the Network

It became clear that simply meeting QoS metrics was not enough, as end users remained dissatisfied with the level of service. In real-world experience, their needs remained unmet. So where did the gap lie?

A clear stumbling block was the lack of visibility into the actual user experience, which occurred beyond the CPE. The next was the need to optimize the service experience beyond that point and deliver a QoE that met the customer expectations.

To address this, Aprecomm developed the AI-powered Virtual Wireless Expert (VWE) platform that provides deep visibility into the network, revealing issues affecting internet connectivity between the CPE and the end user. VWE helps detect issues such as device incompatibility, physical obstructions, excessive network load, and other performance-impacting factors. With remote management enabled, VWE helped providers reduce issue resolution time and truck rolls dramatically, leading to significant business benefits.

In a proven example of the success of Aprecomm's VWE deployment, Excitel, a service provider partner, experienced positive results across multiple metrics. These included:

- **20% reduction** in subscriber churn
- **30% reduction** in support call duration
- **35% improvement** in first-call resolution
- **62% reduction** in truck rolls
- Surge in new subscriber acquisitions post-pandemic, fuelled by a growing reputation for exceptional QoE and service reliability

[Read our case study](#) on how Aprecomm's VWE is powering Excitel's Network.

ACT Fibernet is one of the latest service providers to deploy Aprecomm's QoE monitoring and optimization solution and has recently reported significant Wi-Fi performance improvements just 15 days after launching the solution, including:

- In the initial 15 days after the launch across 250,000 homes, ACT SmartWi-Fi® users enjoyed an average speed improvement of 3X on all devices.
- Over 80% of Smart TVs, 70% of laptops, and 60% of mobile devices were successfully steered to optimal Wi-Fi channels, ensuring a more reliable and high-performing experience.
- ACT SmartWi-Fi® has also significantly improved speed and throughput on specific devices—it is nearly two times faster on Smart TVs, two times faster on laptops, and four times faster on smartphones.

[Read the press release](#) that reported on these metrics.

Application-Aware Network Optimization

The need to optimize the network for better utilization called for innovative thinking. A study of usage patterns revealed that the internet is utilized for a wide range of applications, including streaming video services like Netflix and YouTube, cloud gaming platforms such as GeForce NOW and Xbox Cloud Gaming, and work-related VoIP or video calls via Zoom and Microsoft Teams. Each of these applications falls into distinct categories with unique network performance requirements.

While internet providers traditionally maximized all network parameters to enhance service delivery, the key insight was in recognizing that each application has unique performance tolerances. Aprecomm leveraged this understanding to develop an engine that is trained to intelligently learn and adapt to ensure optimal prioritization of applications based on their specific requirements.



Aprecomm's Application Awareness and Optimization Smarts

Aprecomm's application-aware software, part of its Evolv® AI-engine, profiles application behaviour based on real-time demands and its tolerance to network parameters such as jitter, speed, inter-packet gap, packet loss, and queue lengths.

The software continuously tracks and scores the QoE delivered by the application based on real-time network conditions. HIsense—the Happiness Index Sense—is the term defined for the value measured and attached to the end-user experience by the engine. Whether it's prioritizing low-latency connections for video calls, reducing jitter for gaming, or maximizing throughput for 4K streaming, the engine dynamically adjusts performance metrics to enhance QoE, ensuring seamless connectivity for every user.

The application awareness and optimization smarts derived from agentic AI optimize network performance based on application-specific requirements. Operating continuously, it leverages deep packet inspection (DPI) to analyse and understand real-time traffic patterns. Employing AI/ML models, the solution predicts and adapts to application behaviour to deliver a personalized, seamless user experience.

HiSense is Aprecomm's patented QoE index that measures the happiness of each end user. The algorithm samples and blends multiple metrics, including latency, packet loss tolerance, bandwidth, application statistics, and network parameters, to produce a unique end-user happiness score. Service providers can access the metrics to understand network usage, help support subscribers, and, when paired with Aprecomm's intelligent optimization engine, improve the application or service performance proactively.

The solution utilizes correlation analysis, inference models, and intelligent decision-making AI models to measure end-user experience. The nuanced understanding of the acceptable variations in performance metrics, which are application-specific tolerances, underlines the solution's approach, which is used by underlying agentic AI applications to provide the recommendations and fine-tune the network, ensuring optimal QoE across diverse applications. This adaptive approach ensures that each application receives precisely the resources it needs for peak performance when they are needed most.

Agentic AI is an artificial intelligence-powered system capable of making autonomous decisions. These systems are also able to act in complex situations with limited supervision. Agentic AI autonomously handle complex tasks ranging from network optimization to customer journey orchestration while adapting in real time, collaborating across systems, and executing decisions to enhance performance, efficiency, and user experience.





Mastering Technical Tolerances: At the Core of the Evolv[®] AI-engine

Unlike traditional QoS-based systems that apply the same rules to all traffic, the application awareness and optimization solution recognizes different application types and understands their unique performance tolerances.

For instance, let's take a remote work scenario with two users working from home. One remote worker is on a Zoom video call, and the other user is uploading large files to a cloud backup service (e.g., Google Drive, OneDrive).

Traditional QoS would allocate equal bandwidth between both users, but this will not account for their differing needs. The Zoom user requires low latency and minimal jitter for clear video and audio, while the cloud backup user requires high bandwidth but can tolerate delays without noticeable impact.

Aprecomm's solution understands priorities and will use this application awareness to prioritize Zoom for ultra-low latency and jitter-free communication while temporarily deprioritizing

cloud backup during the call, resuming full speed as soon as the call ends. The outcome is that both user needs are met without any visible delays or interruptions.

Most importantly, these AI-driven QoE enhancements occur automatically, proactively, and invisibly to the end user. This challenges the common—yet often overstated—assumption held by some vendors that subscribers want direct control over their QoE. In reality, only a small segment actively seeks such engagement, while the vast majority expect seamless quality without the need for manual intervention.

AI-powered adjustments ensure critical real-time applications always perform optimally while non-time-sensitive activities use available bandwidth efficiently.

QoE: The Driving Force for Autonomous Networking

Early QoE technologies began with localized network awareness, focusing on real-time monitoring of individual network elements. As the technology progressed, systems developed more comprehensive visibility, enabling a holistic understanding of interconnected network components. Cognitive inference emerged, allowing advanced data-driven reasoning and predictive insights. This evolution culminated in autonomous systems capable of intelligent decision-making, real-time performance evaluation, and adaptive strategy refinement.

Modern QoE approaches have become increasingly sophisticated, spanning basic radio-link condition assessments to complex, multi-dimensional performance optimization frameworks. Current technologies integrate radio and network parameters, real-time application metrics, and historical demand patterns. The most advanced systems now employ AI-driven analytics to proactively predict and prevent potential performance issues, representing a self-learning and continuously improving approach to network quality management.

From QoS to Intelligent QoE

QoE has evolved from a static, network-centric model (QoS) to a dynamic, user-centric approach driven by advances in:

- **AI-powered, intuitive, self-healing traffic management that learns and adapts in real time.** Machine learning models trained on vast datasets detect patterns in network usage and intuitively adjust routing and bandwidth allocation, prioritising applications to optimize performance.
- **Edge computing that brings processing closer to the user and reduces latency.** Decentralized data processing and moving computing to the network edge minimizes delays, enhancing responsiveness for real-time applications while also improving data security and enhancing sustainability by reducing the need for continuous cloud traffic flows.
- **Predictive analytics that anticipate congestion before users experience degradation.** Intelligent systems continuously analyse historical and real-time network data, while predictive models identify congestion patterns and self-heal, proactively adjust traffic flow, reroute data, or allocate additional resources before end-users are impacted by performance issues.

Preparing for What's Next

The transition from QoS to QoE is no longer optional—it's necessary and imperative. Users expect flawless experiences and ISPs that fail to deliver risk losing customers to more agile competitors. Intelligent, intuitive, application-aware, and self-healing QoE solutions represent the future of intelligent network optimization, ensuring that every user gets the best experience possible in real time.

With the rising demands of cloud computing, real-time collaboration, and entertainment streaming, traditional QoS-based approaches are on their way to becoming obsolete. The future of the internet belongs to QoE-driven, AI-powered network intelligence, and innovative solutions will lead the way.

| QoS vs. QoE: What Makes Them Different | | |
|--|--|--|
| Aspect | Quality of Service (QoS) | Quality of Experience (QoE) |
| Core goal | Measures network performance using technical metrics | Measures user satisfaction based on actual experience |
| Primary focus | Network-centric | User-centric |
| Key metrics | Bandwidth, latency, jitter, packet loss | Perceived video quality, Voice clarity,Gaming smoothness, Overall user satisfaction(HiSense) |
| Evaluation criteria | Based on predefined thresholds (e.g., SLA compliance) | Based on user perception, behavior, and real-world conditions |
| Optimization approach | Static rules and configurations | Adaptive, real-time adjustments based on application needs |
| Use cases | Ensuring a connection meets technical standards | Ensuring smooth video streaming, lag-free gaming, and high-quality calls |
| Adaptability | Fixed parameters that may not reflect real user experience | AI-driven, dynamically adapts to real-time network and user experience. user demands |
| End goal | Maintain network efficiency | Deliver seamless and satisfying user experiences |



Get in Touch

Learn more, request a demo, or explore how we can help:

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