

# Pipeline

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## Understanding Service Assurance in Next-gen Multimedia Networks

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Competitive pressure is heating up, and mobile operators worldwide are making the move to Internet protocol (IP) networks to bolster their revenues with enhanced services. As voice becomes increasingly commoditized, providers are scrambling to create new service mixes that provide the “always-on,” interactive communications that people have come to expect from the Internet. The demand for mobile multimedia services like mobile Web, gaming, mobile instant messaging, and video-on-demand is driving a profound network transformation as well as a fundamental change in the mobile business model. The new mobile media landscape is also forcing operators to rethink their service assurance strategies.

### Changing Networks and Business Models

While it is clear that mobile operators will eventually move to end-to-end IP networks, they are taking a variety of paths to get there. Some are placing their bets on [next-generation networks](#) (NGNs) like voice over IP (VoIP). Others are using NGN as a stepping stone to Internet protocol multimedia subsystem (IMS). And a few daring operators are jumping right into IMS technology. But, regardless of the migration strategy, the reality is that hybrid networks – a combination of circuit-switch, NGN and pre-IMS, session initiation protocol (SIP)-based technologies – will coexist well into the foreseeable future. Operators will have to interwork a multitude of technologies, protocols and network resources for many years to come to ensure seamless service delivery.

The shift from voice to the distribution of multimedia content and applications is altering the traditional telecom business model, as well. The lines between the telecommunication and media content industries are blurring. New players like Google (You Tube), eBay (Skype), and social networking sites like Facebook, MySpace, and Twitter, are moving in to claim a stake in the lucrative, converged multi-service market. As a result, business value chains are becoming increasingly complex. Telecom operators must expand their business model to include new players and partners such as content providers, advertisers, and mobile virtual network operators (MVNOs). This new value chain creates new arbitration and service level agreement (SLA) requirements.

### Complex Service Compositions

IP enables a new universe of media-rich services and applications. Person-to-person, person-to-content and group services expand the realm of subscriber communication. Interworking applications to produce a multimedia experience requires the orchestration of a staggering array of personal access devices with a multitude of access technologies and network resources. And, coupling those applications with presence- and location-based capabilities compounds the operator’s challenge.

## Beyond Basic Monitoring

Deploying a next-gen network is just part of the battle. Operational excellence, a key differentiator in this service/subscriber-focused business model, is equally important to long-term success. Managing complex, converged networks and services poses technical challenges that are non-existent in the circuit-switched world. New protocols, new network elements and the complexity and variety of services can all have a serious impact on service quality. This multi-service converged environment requires a fundamental shift in focus. Operators need to move beyond basic network monitoring and troubleshooting tools to advanced systems capable of overseeing the customer experience, as well as end-to-end network connectivity and service interaction.

A blue rectangular slide with white and yellow text. The title is "Using KPIs to Optimize the Network, Service and Business" in yellow. Below it, in white, is "KPI Service Management Packages Available Today:". A bulleted list follows: "Prepaid", "Roaming", "Short Message Service", "Security", and "Traffic Management". To the right is the Tekelec logo, a stylized white 'T' made of horizontal and vertical lines, with the word "TEKELEC" in white below it. At the bottom center, the website "www.tekelec.com" is written in yellow.

**Using KPIs to Optimize the Network, Service and Business**

KPI Service Management Packages Available Today:

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- Roaming
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## New Performance Management Requirements

The transition from predictable, low-bandwidth voice services to advanced, high-bandwidth data applications dramatically heightens the complexity of network management. The hybrid nature of the network requires operators to support a variety of technologies and interconnections between multiple domains and partners. Each new technology introduces new interfaces and protocols. To deliver mixed services, providers have to support a greater number of network elements to blend real-time services such as voice and video with non real-time applications like presence, availability, and user preferences. Providing seamless service delivery and ensuring quality of service (QoS) in this complex environment requires a flexible [hybrid monitoring system](#) that provides a complete end-to-end view of traffic as it traverses varying technologies and networks. Existing niche monitoring systems are not designed with the flexibility and scalability to provide a complete view of the network with the data, reports, and alarms required to proactively manage multi-technology, multi-protocol networks.

## QoS Complexity

In the highly competitive telecom market, QoS often is the single most critical factor that separates one operator from another in the subscriber's mind. QoS is much more problematic in IP networks than in the circuit-switched world. In the public switched network, connection point interfaces, from which usage data is derived, are well-defined. In the packet world, those interfaces are not so well-delineated. Determining which subscribers are using the network and what services they are accessing is infinitely more complicated. Tracking services presents its own challenges since

subscribers have more service options. For example, a customer making a conference call can actually be using several services simultaneously – voice, video and data.

Add to that the fact that the IP domain has many components. On which network element should the operator focus to gather mission-critical usage data? No single resource can tell the whole story. In the IP domain, operators have to change their approach when it comes to service assurance. They must move from checking the health of a single, large box – the Class 5 switch – to monitoring and managing the network end-to-end and all of the associated resources. That approach requires new performance metrics and collection methods.

### **Quality of Experience (QoE)**

QoS in the circuit-switched world largely is taken for granted. Operators have had decades to develop and perfect their diagnostic systems. But, as operators move to IP networks and applications, service quality can be elusive and hard to achieve. Numerous factors can degrade a session's connection quality – a delay in packet delivery (latency), missing data (loss of packets), or data arriving out of order (jitter). For example, imperfections in the transmission media can result in pulse degradation or loss, leading to bit errors. Entire packets of information can be lost as a result of routing variations or switch capacity limitations. And, packets can arrive out of sequence as they traverse different routes to the end point.

QoS can be greatly improved with a variety of techniques such as prioritizing packets, buffering, and placing strict tolerances on end-to-end delay and jitter. While QoS can indicate how well a packet is preserved in transport, it does not represent what the customer hears and sees – the quality of experience.

When it comes to VoIP and multimedia applications, QoE must be considered a high priority. For services like video conferencing to be successful, they must mimic real life. This requires the synchronization of audio and video to create an experience that closely resembles a face-to-face conversation.

### **Mean Opinion Score (MOS)**

The need to correlate what the consumer expects to see and hear with what they actually experience has led to the development of a QoE measurement – the mean opinion score (MOS). The MOS, initially applied to voice telephony, has been extended to data and video. It provides a numerical measure of the perceived quality of the media received after it is transmitted and eventually compressed using codecs. QoE is most critical for video applications, which are more sensitive to IP impairments than voice services. Packet delay or loss can produce a range of degradations in the service (and customer) experience. It is not a simple matter of determining what bits are lost; where those bits reside in the video frame sequence is also important. For example, even a low packet loss can produce severe degradation if the reference or "I-frame" is impacted as that degradation is propagated to subsequent frames.

### **Deep Packet Inspection (DPI)**

DPI has emerged as a valuable technology to aid operators in their quest to create application-aware networks. With DPI, operators can look inside the packet payload to identify individual streams of traffic on a per-user and per-application basis. Armed with this granular level of information, mobile

operators can carry out marketing, engineering, and operations functions in a much more sophisticated fashion than was possible with the traditional technique of simply analyzing the packet header.

On the marketing side, operators have much better visibility into exactly which services their subscribers are using. With that information, they are better able to determine what new services to offer in the future. From the operations perspective, DPI enables more effective and efficient network monitoring and troubleshooting as well as a greater awareness of potential security threats. Engineering groups gain a better understanding of traffic trends and capacity requirements that enable enhanced network planning and optimization.

### **End-to-End Call Trace Capability**

As the networks converge, a single call or session can traverse multiple networks, including time division multiplexing (TDM), VoIP, IMS, 2G/2.5G/3G and cable. Therefore, the ability to perform a real-time call or session trace network-wide across multiple interfaces and protocols is critical. With this capability, operators can tie together messages for each session and track it across network points to determine where irregularities and failures occur. Operators must have the ability to test multiple network technologies, route calls efficiently and effectively, and monitor traffic as it passes through signaling and media gateways and across their networks. As the networks converge, it is essential to have end-to-end visibility to pinpoint anomalies and understand the customer experience.

### **Real-time Subscriber and Service Data**

The key to profitability in delivering multimedia services across converged networks is having access to real-time data that allows the operator to understand the quality of service and customer experience. Complex, multimedia applications require real-time monitoring. Historical data and post-mortem analyses provide little benefit in the world of interactive media.

To maintain customer satisfaction and ensure the successful delivery of new services, operators need tools that track service availability, reliability, and delivery. Equipped with real-time data, operators can identify the source of service disruptions before customer complaints arise and revenue is lost. They can trace transactions, verify service delivery, and identify the source of failed transactions. Real-time statistics for each subscriber, including send/receive time, throughput, abort rates, and transmission rates, are critical to understanding service efficiency and the customer experience. Service usage data also permits providers to identify the most popular services, enabling them to create new, targeted marketing programs that increase revenue.

### **Key Performance Indicators (KPIs)**

Whether in NGN, 4G/WiMAX or future IMS networks, visibility into the user experience and service interaction is critical to service assurance and network performance. Operators will require new [KPIs](#) that analyze not only signaling messages but also the quality of the voice and data payload. As operators move to service- and subscriber-focused networks, they will need new metrics that measure network availability and accessibility, as well as service accessibility, integrity, and retainability.

## Summary

As operators roll-out media-rich applications, they need to rethink not just the network architecture but also their [service assurance](#) strategies. Service reliability, optimal network performance and quality of experience are critical to maintaining a competitive advantage and ensuring profitability. In this multi-technology, multi-service environment, a service assurance solution that provides end-to-end subscriber and service visibility allows operators to move from simply meeting subscriber expectations to delivering an outstanding customer experience.

About Tekelec Tekelec's market-leading solutions enable the secure and instant delivery of calls and text messages for more than one billion subscribers. The company's session management solutions allow telecom operators to manage diverse applications, technologies and protocols, across existing and evolving networks, to meet the demands of today's consumer and whatever comes next. [www.tekelec.com](http://www.tekelec.com)

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