

## Visibility: The Key to Monitoring Hybrid Networks

By Vincent Lesch

Fixed-line networks, which serve more than 1.2 billion subscribers worldwide, were for many years the backbone of voice communication. They were predominantly based on a single technology – time division multiplexing (TDM) - providing a single service - voice. That telecommunication's landscape, however, is being transformed by advances in technology, the Internet, deregulation, mergers and acquisitions, global roaming, and the demand for multimedia services. Mobile networks now support more than two billion subscribers, and IP-based voice service is growing at a blistering pace. The increasing demand for multimedia content and services is driving the evolution to an all-IP network core with a variety of technologies at the edge, including cable, digital subscriber line (DSL), 2G/3G, long term evolution (LTE), and WiMax.

Today's operators do not have the luxury of managing and maintaining a single network type. They not only interconnect with other providers' networks to ensure global coverage, but, increasingly, own and operate a myriad of network types – mobile, fixed, cable, voice over Internet protocol (VoIP), data packet and [Internet protocol multimedia subsystem \(IMS\)](#) - to keep pace with changing customer demands. In this hybrid operating environment, the ability to manage, monitor and troubleshoot cross-domain transactions is critical to protect and grow revenue, ensure quality, and guarantee service delivery.

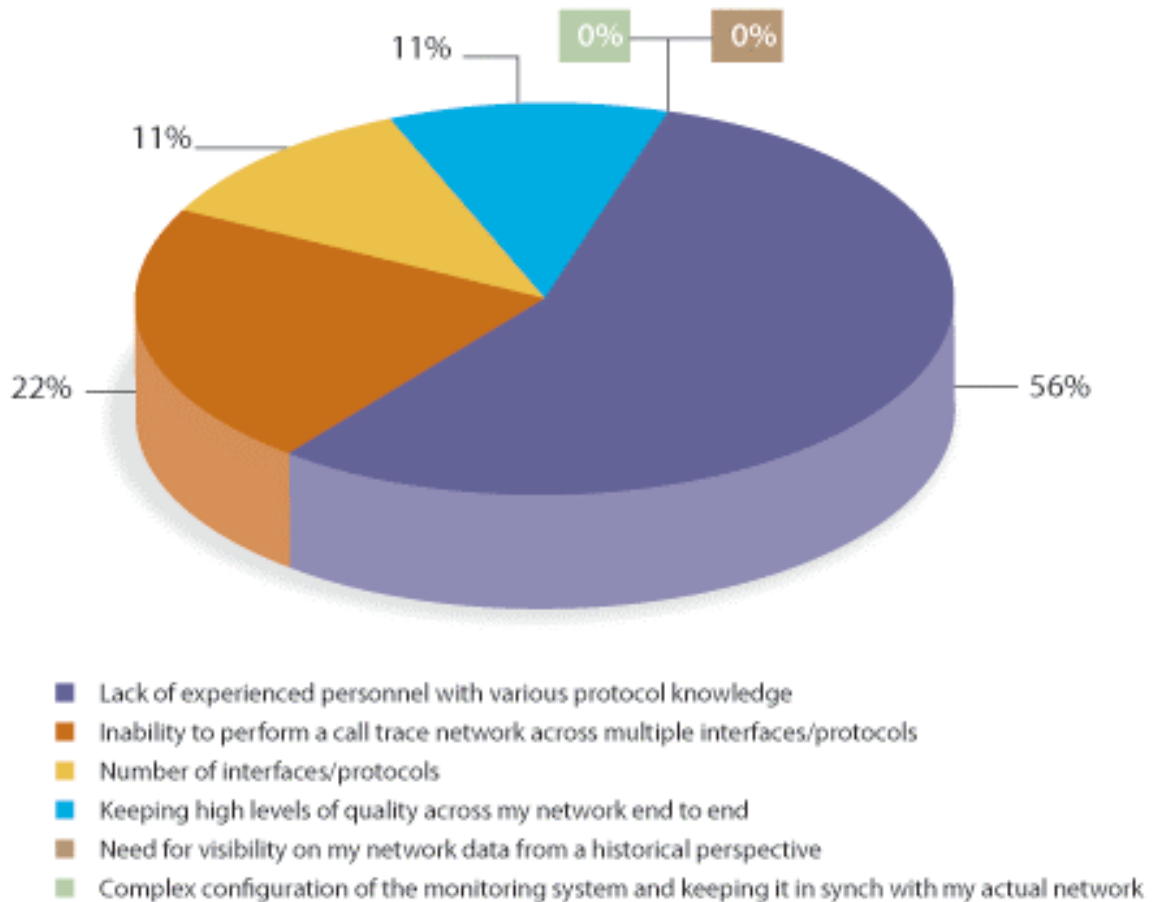
## Operating a Hybrid Network: The Challenges

Each network has its own technology, protocols, and monitoring team. Who within the provider's organization has the network-wide visibility to monitor and troubleshoot a call or multimedia session end-to-end? How can an operator identify the source of failure when several, disparate networks are involved in the route? How can providers gather vital data for subscribers roaming in their network to ensure quality of service (QoS) and capitalize on revenue opportunities? What are the [key performance indicators \(KPIs\)](#) that should be monitored?

These problems were underscored in an on-line [webinar survey](#) conducted by

Tekelec in December 2007. Participating operators were asked to identify the main challenges they face in monitoring hybrid networks. The "lack of experienced personnel with various protocol knowledge" was identified by 56 percent as the biggest challenge. Twenty-two percent cited the "inability to perform a call trace network-wide across multiple interfaces/protocols."

What is the main challenge operators face in regards to monitoring a hybrid network?



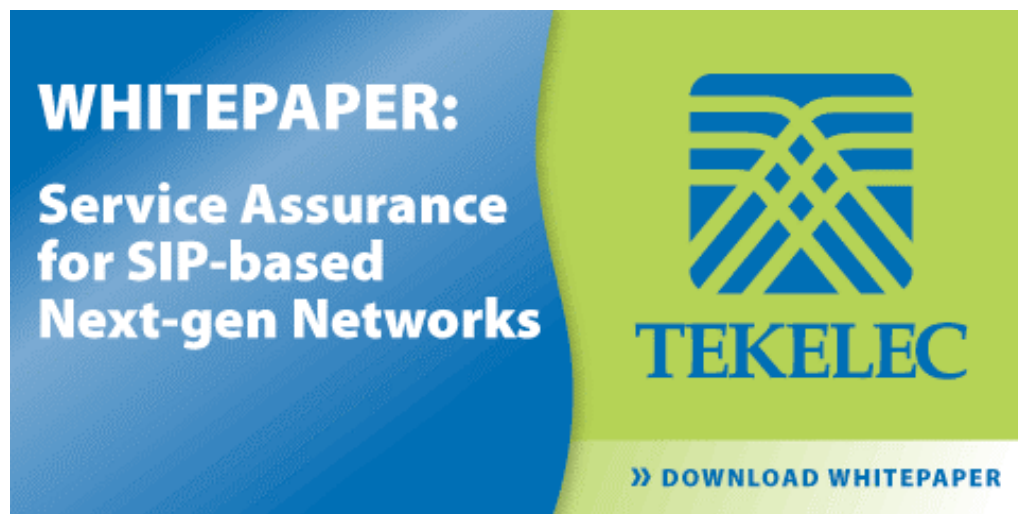
### Network Complexity

Network troubleshooting is becoming increasingly complex, especially for operators who already operate multiple networks using different technologies and protocols. Because of the hybrid nature of existing networks, the migration to a converged all-IP network will take many years. Providers will have to support a variety of networks and interconnections between the networks well into the future. Each new technology requires new interfaces and protocols. The delivery of mixed services introduces another layer of complexity. Operators 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.

Advanced technologies, consolidation, new entrants, and global roaming are forcing operators to manage multi-vendor, multi-protocol networks. Carriers want the freedom to evolve their networks but must carry the burden of legacy resources and technologies in their own networks as well as in partner networks to which they interconnect.

Mediation is required to interconnect the disparate technologies. And, it involves more than linking one network type to another such as fixed and mobile. Mediation challenges exist within networks that may contain not only different technologies such as [bearer independent call control \(BICC\)](#) protocol and [session initiation protocol \(SIP\)](#), but also different versions of the same protocol, like customized applications for mobile network enhanced logic (CAMEL) v1 and CAMEL v2. Additionally, providers must manage the interaction and mediation between resources such as mobile switching centers (MSCs) and service control points (SCPs) from multiple vendors that may have vendor-specific implementations of the same protocol.



### **Lack of Experienced Personnel and Adequate Tools**

As fixed, mobile and IP networks converge to deliver blended services, grasping the end-to-end interrelationships between each network and its resources presents a formidable challenge. Complex networks and cross-domain signaling call for operational tools and personnel expertise that span the entire network.

Existing tools built for legacy networks often do not support new network protocols such as SIP, IMS service control (ISC) and Diameter. Monitoring personnel within

the operator's organization are typically trained in a single technology and its related protocols. As a result, providers monitor each network independently with tools and personnel dedicated to each technology. As new technologies or services are deployed, they must continue to invest in new equipment and employee training. This approach yields a fragmented view of the network; data is pieced together from a variety of systems and personnel. Most operators lack a common set of applications and the consolidated expertise that can be applied uniformly across all types of network technologies and protocols to gain a holistic view of their operations and services.

### **Limited Network Visibility**

One of the major challenges operators face as they evolve their networks to support Internet VoIP and multimedia sessions is their inability to trace transactions end-to-end across the networks. Complete, real-time visibility and historical data are essential for effective network management, as well as service and revenue assurance.

Many providers have deployed monitoring tools for each technology, but this approach provides just a limited, fragmented view of the network. As networks converge, it is critical to have real-time, end-to-end transaction visibility to proactively pinpoint network anomalies and understand the customer experience. Assuring quality and maximizing network performance require the ability to identify traffic levels, perform circuit-utilization studies, calculate and monitor call-completion rates, and trace calls throughout the network.

Effective management of [hybrid networks](#) necessitates a single vantage point for collecting and analyzing real-time, network-wide data. The ability to evaluate and characterize network usage enables operators to maximize network resources and reduce operating costs. Complete call flow records and historical data also provide a view to the signaling interaction between network resources and the ability to pinpoint network abnormalities. With detailed data, providers can accurately engineer network components to ensure the highest level of QoS.

### **Monitoring Essentials**

Operating a hybrid network introduces a myriad of business, management and security issues. To effectively address these challenges, operators need tools that enable them to perform certain essential functions.

### **Troubleshoot in Real Time**

As new services and network elements are rolled out in a hybrid network, real-time visibility into everything going on within the networks is essential to understanding and tracking network performance. For example, before launching new services and

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networks, extensive interoperability testing is required. The ability to supervise the transactions between domains – fixed, mobile, VoIP, and IMS – and monitor the protocols as they convert across gateways is essential to test and assure interoperability and ongoing network performance. Additionally, operators must be able to identify failures between gateways, trace registrations in the SIP domain and track authentication. From a customer perspective, providers require real-time and historical data to determine why subscribers are unable to access e-mail, troubleshoot download failures from ringtone servers, and even identify issues with traditional intelligent network (IN) services, such as calling name and number portability.

### **Optimize and Evolve the Network**

A key short-term concern for operators as they grow their network is maximizing their resources – getting the most out of legacy and next-generation elements. Complete, real-time network visibility is essential to proactively manage the network and protect revenue. Operators need a system to collect statistics and performance data related to all of the traffic traversing the network, including: identification of traffic levels; circuit utilization studies; calculation and monitoring of call-completion rates; and real-time tracking of calls throughout the entire network. Once they have the data in hand, providers require tools that allow them to analyze and characterize network usage in order to plan effectively, handle growth, support service level agreements (SLAs) and avoid unnecessary capital expenditures.

From a long-term perspective, operators need to understand how to evolve the network. They need access to statistics that enable them to dimension the network to avoid bottlenecks and performance-impacting bandwidth problems. Data and detailed traffic reports are essential to identify and quantify voice and data traffic, manage trunk utilization, calculate throughput of network elements, and perform traffic studies across all network segments. This data can be used to ensure that the network is adequately designed to meet the demands caused by increases in roamer and subscriber activity.

### **Track and Document Service Usage**

The key to profitability in delivering multimedia services across converged networks is having access to data that allows the operator to understand the quality of the subscriber experience. To maintain customer satisfaction and ensure the successful delivery of new services, providers 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.

The ability to supervise the performance of services across the network allows operators to gain insight into the subscriber experience. 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. This service usage data also permits providers to identify the most popular services, enabling them to create new targeted marketing programs that increase revenue.

### **Ensure Voice Quality**

Voice remains one of the largest sources of revenue and margin for operators. As they continue to transition network technologies, the ability to assure high-quality service across hybrid networks is paramount to profitability. Subscribers have become accustomed to the high quality and 99.999 percent reliability of fixed-line networks, though they are willing to accept lower quality and reliability when it gains them utility – like the mobility and convenience of cell phones. But with VoIP networks, what kind of reliability will subscribers accept? Will they be willing to forgo “always on” reliability for lower cost? In the competitive telecom industry, quality of service is quickly becoming a market differentiator, and customer churn is a major concern. As operators make the transition to IP networks, they need tools that enable them to quickly identify and resolve VoIP call-control problems to ensure QoS to protect their customer investment.

Maintaining voice quality also is critical to upholding SLAs. For crucial customers, operators need equipment that allows them to proactively manage service quality in real time, alerting them to “near misses” so quality issues can be addressed before SLA violations occur. Defining real-time alarms on traffic conditions, setting thresholds and implementing KPIs and key quality indicators (KQIs) are critical capabilities to be taken into account when evaluating a network monitoring solution.

### **Conclusion**

It is a given that telecom networks will evolve gradually over time, requiring operators to interwork a myriad of network applications, services, technologies, and protocols. The key requirement for providers in this hybrid environment is maintaining quality of service to proactively manage the subscriber experience.

To ensure QoS, operators need a single [monitoring solution](#) that provides a holistic view of their entire network – one that supports both existing as well emerging technologies and protocols. As new services and network elements are rolled out, real-time visibility into the networks is essential to understanding and tracking performance and subscriber behavior. The ability to trace a single transaction, call or session end-to-end across different domains is critical to understanding and troubleshooting the interaction of network elements.

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### **About Tekelec**

Found at the heart of most global networks, Tekelec's market-leading, mission-critical, high-performance network solutions enable the secure and instant delivery of calls and text messages for more than one billion mobile and fixed-line subscribers. The company's session management solutions allow telecom operators to manage the diverse applications, devices, technologies, and protocols across existing and evolving networks, to meet the demands of today's consumer. Tekelec uniquely ensures telecom operators have a clear migration path to SIP-based IP networks, and whatever comes next, with the flexibility to deploy solutions at a pace dictated by their business needs. For more information, please visit [www.tekelec.com](http://www.tekelec.com).