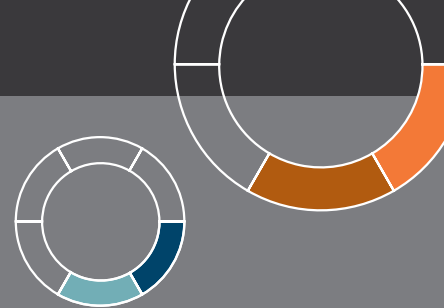


# End-to-End Mobile Service Quality —

From Data Center to Cell Tower



# InfoVista Helps to Overcome the Challenges of Delivering Mobile Data Services



Whether it's reliable, uninterrupted voice connectivity, or real-time access to content and data, today's smartphone and wireless PC users expect the utmost quality when it comes to the service they get from their providers. With every dropped call, dropped packet, instance of jitter, or failed download, a mobile service provider risks losing subscribers and high-value business customers to the competition. This is why ensuring high-quality, always available wireless voice and data services from one end of the network to the other—and back again—is a must.

But delivering this level of unquestionable, end-to-end service quality is easier said than done due to the complexity and cost of managing today's mobile data infrastructure and the "explosion" of data traffic crossing it. An inundated router, a downed line, or a crashed server can leave hundreds or thousands of subscribers without service, while leaving the service provider vulnerable to disgruntled customers, churn and lost revenue.

For these reasons, mobile service providers must be able to quickly identify network trouble spots and the effect of bandwidth-hogging applications—before customers are impacted. They must do so in an increasingly complex delivery environment (consisting of legacy, data center, IP/MPLS, Ethernet backhaul and 4G technologies—from multiple equipment vendors), while keeping network and service operations costs as low as possible.

InfoVista enables mobile service providers to overcome these critical performance, quality and cost concerns by addressing the underlying challenges of mobile data service delivery, the management of the IP transport architecture, and the proliferation of service assurance tools.

## The Challenges of Delivering Mobile Data Services

For service providers, mobile data is both a blessing and curse. Data services represent mobile service providers' fastest growing revenue stream, accounting for up to 50 percent of growth compared with the fairly flat revenue growth from voice services.

On the other hand, the exploding volume of bandwidth-intensive mobile data traffic has made it difficult for operators to ensure quality and availability on these data services. Service providers must be able to:

- Differentiate themselves from competitors by assuring a quality end-user experience on data services and applications
- Build trust with and retain high-value business customers, especially where service-level agreements are critical
- Hold third-party application providers and Internet service providers accountable for the quality of the applications traveling over the network

## The Challenges of an All-IP Transport Architecture

The recent explosion in data traffic has led operators to increasingly recognize the importance of IP/Ethernet technology as a cost-effective transport medium, and place a significant amount of emphasis, effort and investment on the transport network as a network asset. This is best seen in the mobile backhaul domain where many mobile operators are looking to use Carrier Ethernet within the next two years.

The all-IP network infrastructure provides the ease of deployment and bandwidth to deliver both packet-based voice and data services over a common transport backbone while reducing the operators' growing infrastructure costs. But with the dawning of this all-IP network infrastructure, a host of management challenges have emerged. These include:

- Providing the same quality of service/quality of experience that users are accustomed to receiving over legacy transport network technologies such as TDM, including support of timing and synchronization mechanisms, which are critical for call hand-offs
- Equipping transport engineering and operations groups with the same level of operational and engineering capabilities they had with TDM
- Meeting the bandwidth demands of mobile data and application users without oversizing (and overspending on) network infrastructure
- Monitoring performance and capacity across the entire mobile network infrastructure, including the backhaul network, regardless of its multi-generation, multi-vendor, multi-domain composition

### The Challenge of Proliferating Service Assurance Tools

The majority of today's service assurance tools are designed to tackle either per-subscriber service monitoring, mobile infrastructure monitoring, or transport monitoring, but not all three at once. This has resulted in a proliferation of tools and made assuring the end-user experience an increasingly difficult and expensive proposition. Hence, IT departments have struggled to:

- Manage down both capital and operational expenses
- Employ a single, vendor-agnostic toolset that can address both service and network management requirements, including transport monitoring, from end to end

## InfoVista Meets These Challenges

InfoVista offers a single, unified platform that enables mobile operators to assure availability and quality on the mobile services they deliver while keeping capital and operational expenses down.

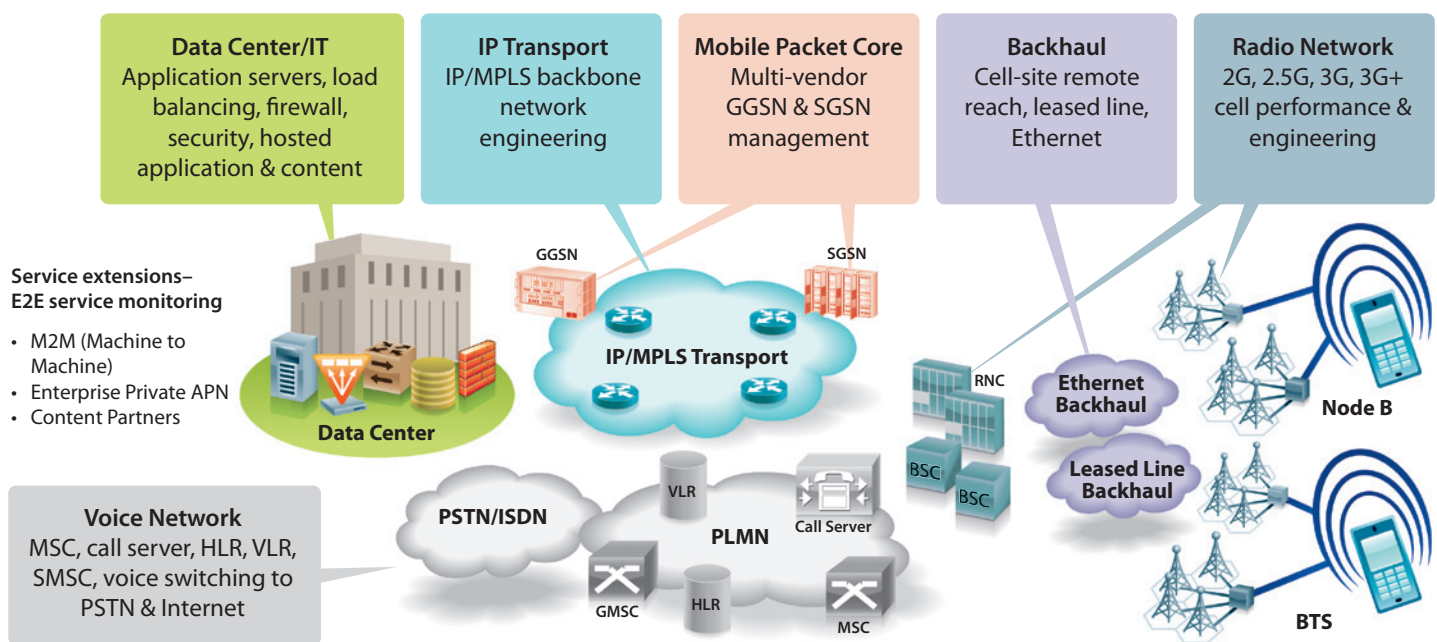


Figure 1. Segmented mobile operations and tools



## Deliver High-Performance Mobile Data Services

InfoVista's comprehensive solution helps mobile service providers to assure the performance of data services and applications on a per subscriber basis. The solution also provides real-time monitoring and reporting of every infrastructure entity along the service delivery path, from data center to mobile packet core, to the IP/MPLS backbone, radio access network and the Ethernet backhaul, thus dispensing with the siloed approach of network and service management tools that can report on either network or service performance only. By offering mobile operators this holistic and proactive view of the health of their network infrastructure and the services and applications traversing it, InfoVista empowers service providers to immediately understand the relationships between resources, the services they support and the respective performance indicators. This enables the providers to proactively identify the network root causes of service degradation.

In addition to these quality-of-service (QoS) capabilities, InfoVista's mobile service assurance solution delivers direct business benefits, such as providing mobile operators with insight into new service opportunities. InfoVista's mobile IP probe provides mobile operators with a view into the types of applications each subscriber is using by offering deep packet inspection (DPI) between the SGSN and GGSN nodes and in the data center. This enables the service provider to not only more readily pinpoint problems but also understand subscriber activity and preferences. Thus, if the operator identifies a high level of requests for a specific application coming from the student area of a particular city, it can follow up by tailoring a product it can market to that segment and demographic.

InfoVista also provides the reporting capabilities mobile operators need to offer service-level guarantees. For mobile service providers, the biggest market is the consumer market, and ensuring that services are always available and meet end-user quality expectations, regardless of where the consumer is using his or her mobile device, is critical to avoiding churn. But as business from wireless VPNs and machine-to-machine (M2M) offerings increase, these providers must also do everything they can to protect their high-value enterprise accounts by delivering the level of service these corporate customers are paying for. InfoVista empowers these mobile operators to provide their customers with custom dashboards depicting such compliance.

On the other side of the coin, mobile operators have an obligation to their subscribers to ensure that contracted application partners are delivering content of the highest quality. Subscribers look to their mobile provider to troubleshoot and deal with quality issues, even if the problem originates from a third-party content provider. Further complicating quality assurance is that the infrastructure between the mobile operator and its third-party content providers is typically a leased ISP connection that the operator has no control over. InfoVista's application DPI offerings help mobile operators remotely monitor the performance of applications coming from content partners. These offerings can also further sectionalize the views into TCP delays and actual application response delays, helping mobile service providers distinguish between ISP connectivity issues and poor remote-application performance.

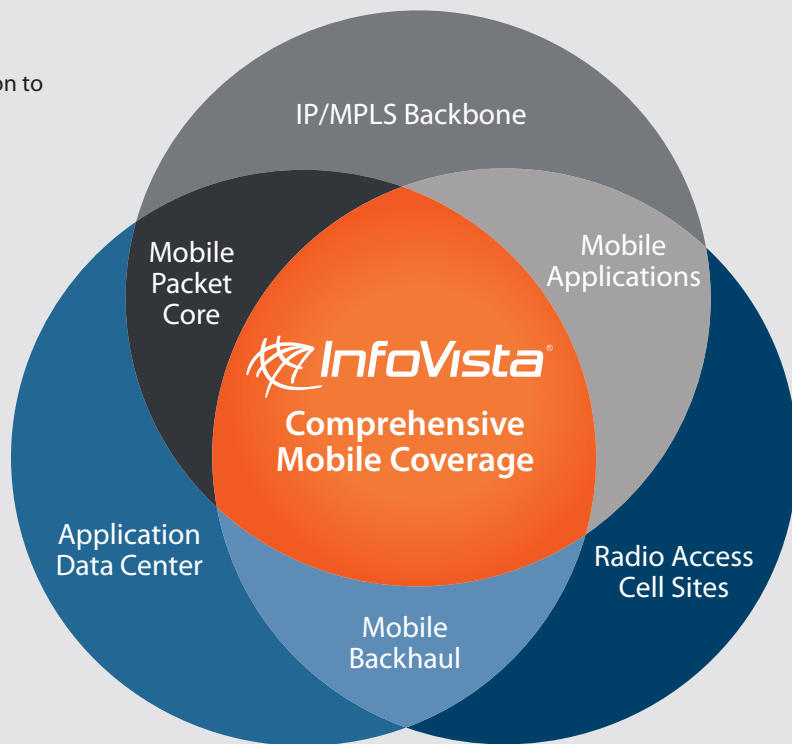


Figure 2. InfoVista provides a consolidated view of end-to-end service quality from data center to cell tower



## Accelerate ROI on the All-IP Transport Infrastructure

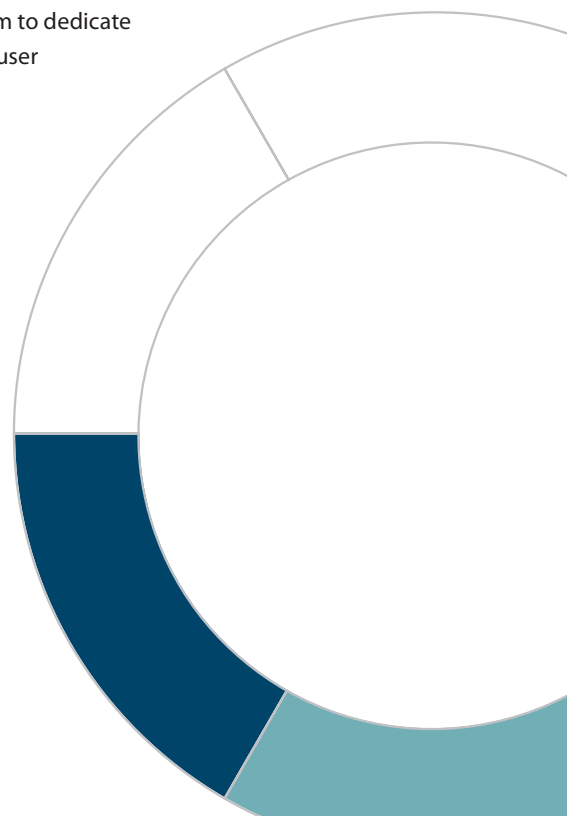
InfoVista enables mobile service providers to monitor, report and ensure quality and sufficient capacity across the all-IP transport infrastructure, including the backhaul. It allows providers to troubleshoot transmission to cell sites, tackle the timing and synchronization challenge inherent to Ethernet backhaul networks, and rightsize the networks to meet the original economic objectives of Ethernet backhaul.

Using InfoVista, operators can also adeptly handle sudden surges in data traffic (temporal and geographic variances in mobile data use) that strain the backhaul domain. For instance, a sports arena like Wembley Stadium on a Saturday afternoon can boast up to 90,000 fans, many of whom are sending pictures of inside the stadium as soon as they arrive. This raises the question as to whether the operator wants to oversize the network to handle peak volume periods (100 gigabytes)—or instead consider normal usage (5 GBs) in a particular area alongside the spikes and then throw more bandwidth at the problem only where needed (i.e., rightsizing), which is a more efficient way of handling these potential spikes. InfoVista offers a consolidated view of capacity across the network by capturing capacity KPIs and trends, enabling operators to make the most efficient use of their existing infrastructures and to invest in proportion to demand.

What's more, InfoVista's support of Ethernet OAM enables service providers to assure a superior last-mile experience for delay-sensitive voice and video applications. This also allows operators to ensure that packet-based timing and synchronization mechanisms are not adversely impacted due to end-to-end issues such as delay variation and packet loss.

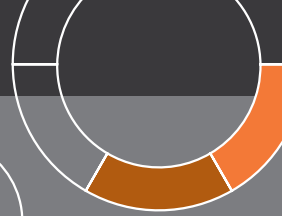
## Standardize on a Single Platform

InfoVista provides a single, integrated network, service and application performance monitoring solution that allows service provider IT departments to manage end-to-end mobile network and service quality in real time, without the cost and delays associated with having to jump between individual OSS toolsets. InfoVista's deep packet inspection (DPI) and probe offerings enable monitoring of individual subscriber sessions and traffic, while its support of leading network equipment vendors, such as Alcatel-Lucent, Cisco, Ericsson, Huawei, Juniper, Nokia-Siemens, and others, allows engineers and operations teams to holistically monitor the end-to-end mobile infrastructure including the IP/Ethernet transport. With this comprehensive visibility, engineers and operations personnel can more quickly troubleshoot and focus on the root causes of service degradation before customers are negatively impacted, enabling them to dedicate bandwidth and analyze and prioritize application traffic in a way that ensures a quality end-user experience.





# Conclusion



The exploding growth in data requests coming from smartphones and wireless mobile devices could strain 3G networks to the point of failure. For mobile operators this failure can have disastrous consequences toward quality of service and customer retention.

Network operations teams must be able to ensure availability and consistent performance on the growing scope of bandwidth-hungry applications and services they deliver to customers, wherever those users may be. They must do this in an increasingly complex delivery environment (consisting of data center, IP/MPLS, Ethernet backhaul, mobile packet core, legacy voice core and mixed-generation RAN), while keeping network and service operations costs as low as possible. A key aspect often overlooked is that the actual transport of that data is done by the underlying IP wireline infrastructure rather than the wireless network facilities. By bringing together the quality of experience (QoE) perspectives from these two domains, providers can comprehensively assure end-to-end quality.

InfoVista offers the end-to-end mobile network and service management that mobile operators need to ensure quality mobile voice and data services and end-user quality of experience. Our unified network, service and application performance management solutions enable providers to monitor, analyze and report on the performance of the IP-based mobile network infrastructure, the Carrier Ethernet-based backhaul network, and the services traversing these connection points.

Make sure the explosion in data traffic over today's heterogeneous mobile network infrastructure doesn't drive up your operations costs, drive down your quality of service, and drive away your customers by taking advantage of end-to-end mobile network and service performance management from InfoVista.



For more information, please visit [www.infovista.com](http://www.infovista.com)  
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