

# Agilent Telecommunications News



## Strategic use of OSS boosts the bottom line

### Also in this issue:

Where does the industry go from here?  
*An interview with Keith Willetts of the TeleManagement Forum*

GPRS service management

A new way to keep up with traffic loads

Overcoming bottlenecks in metropolitan networks

Equipment for optical field testing

Advanced testing of multi-service networks

Remote monitoring for wireless networks

Telecommunication CEOs are setting extremely aggressive goals to increase profits while cutting costs by as much as 30%. The entire industry is being forced to streamline, and as companies regroup to drive down costs, their network infrastructure and management systems are being consolidated.

Although no single strategy exists for achieving these goals, the direction from the top is clear: Cut costs by streamlining, automating, and simplifying operations. Accelerate revenue growth by deploying new

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Through the integration of network and service management, operational support systems (OSS) will play a critical role in providing telecommunication companies with the results they seek.

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**Agilent Technologies**

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Telecommunications News is published quarterly by Agilent Technologies to provide useful information for network operators and communication service providers.

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# Winning in tough times

If we look at the communications market today, the fundamentals appear to be strong. Traffic is moving on the Internet, and analysts predict that the compound growth rate for data traffic will remain high. The wireless industry is still expanding—quite substantially in some parts of the world. For example, Brazil added 8 million new wireless subscribers last year and expects to add the same number again this year. Wireless markets in Russia, China, and other countries in Asia are growing rapidly. Even in saturated markets such as Europe, operators are moving ahead with the transition to 2.5 and 3G networks in anticipation of wireless data demand. Traditional voice service also continues to grow in underserved regions, although at a much less dramatic rate.

If the overall picture looks good, why then is the industry in such a steep downturn? As we know, between 1998 and 2000, telecommunication companies spent nearly 1 trillion US dollars building out the communications infrastructure. Excess network capacity was built ahead of demand, and this precipitated a drop in prices—in other words, price wars. Certainly the US and Europe have seen the fallout, with steep declines in prices for long distance service, local calls, and data traffic.

Unfortunately, the cost of building and maintaining networks increased quite significantly during this same period. For network operators and service providers, the combination of accelerating costs and slowing revenue growth due to falling prices has created cash flow problems and a huge profitability gap. There have been well-publicized bankruptcies, and every company is having to cope with a very difficult situation. Operators have reacted by freezing their capital spending, which strikes a major blow to equipment and component manufacturers. Vendors further along in the industry supply chain also feel the effects.

But freezing capital spending is only a temporary fix; it doesn't solve the long-term problem of how to profitably run networks and deliver services. The solution requires driving down operational expenses in a huge and unprecedented way. Analysts are busy calculating the numbers, and consensus seems to be that the cost of transmitting and switching a data bit must be reduced by a staggering 25% per annum over the next 5 years.

If you are an operator or service provider, you know that while you are cutting costs to the bone, you still must satisfy millions of customers. You have to continue the migration to next-generation networks, and you probably have to navigate these complex changes with fewer people because your organization has down-sized or stopped hiring.

Agilent believes that you can succeed in the face of these challenges by taking focused action—to automate, simplify, and outsource.

Automating your operations is critical to reducing long-term expenses. In the pages ahead, industry visionary Keith Willetts explains why this is so. To provide the framework you'll need for automation, Agilent has combined the power of our world-class operations support system (OSS) software architecture and distributed measurement solutions. Our integrated service assurance is the first example of a new breed of OSS. We combine network-wide views and automated troubleshooting with customer views to provide better service and eliminate the high cost of truck rolls. And we can help you mine network data to increase revenue—as we did for one North American operator, who recovers an "extra" \$60 million per year from interconnect billing data.

Hand-in-hand with automation is the need to simplify operations.

Networks are becoming yet more complex as the old generation of technology gets mixed up with the new. Agilent has ways to greatly simplify the management of hybrid networks by integrating the islands of OSS. Agilent's integrated and modular OSS solutions save you tens of millions of dollars in operating and maintenance costs and provide insights into your business that just can't be had when your systems don't talk to one another.

We also have launched a new generation of test instruments that squeeze the time and cost of installing and maintaining network equipment. One new test set reduces the time it takes to test the transmission pipe from hours to just a few minutes. Consider how much you can save in labor costs and how quickly you can get new revenue-generating services to market! Every instrument we introduce today is aimed at radically simplifying test to produce similar levels of savings.

Our new automated remote monitoring systems for wireless networks are yet another way in which we are revolutionizing the care of networks.

Many companies are choosing to drive down expenses by outsourcing work that is not part of their core business. Agilent is filling the resource gap for many of our customers, particularly in the wireless domain, by helping plan, design, and optimize the networks and benchmark performance against the competition. We are expanding our educational and consulting services, too, and we are ready to help you get the most from all your new and existing network assets.

Agilent has devoted its full resources and expertise to creating real solutions for today's challenges. You can read more about our products and services in the pages ahead. Then, let us know how we can help you win in this toughest of markets.



*Tom White, Senior Vice-President and General Manager, Agilent Communications Solutions Group*

A stylized handwritten signature in black ink that reads "Tom White".

## Telecom New Zealand uses Agilent Firehunter and Cisco IOS® Software Assurance Agent to monitor the quality of customer services

With many kinds of delay-sensitive, differentiated, and mission-critical traffic moving across today's networks, quality-of-service issues have become persistent and complex. To reliably maintain service level agreements, service providers need real-time information on how their networks and services are performing. They also want solutions that can be deployed cost-effectively on existing infrastructure.

Telecom New Zealand asked Agilent for a solution that would verify the quality of services provided to large customers. A new case study documents how the combination of Agilent's Firehunter software and Cisco's Service Assurance Agent (SAA) for Cisco IOS Software enables existing Cisco routers to be

used for active testing and monitoring of customer services. With Firehunter installed in the network and SAA enabled on the Cisco routers at customers' offices and stores, Telecom New Zealand can run active tests from the customer premises to other locations and to the network backbone.

**"These are real-world tests done in real time with real traffic that is constantly running, and SAA and Firehunter are ready to warn if there are performance issues that the carrier should be aware of, before the customer ever notices the problem,"**

**Kerry Thompson, Manager  
Enterprise Service Management  
Telecom New Zealand**

From the data Firehunter gathers, network administrators can spot bandwidth, download speed, or server issues that are affecting service performance. Network administrators then can identify which customers may be impacted. Monitoring also allows administrators to plan ahead for events such as traffic spikes. SAA monitoring through Firehunter will play a prominent role as Telecom New Zealand aggressively launches enterprise voice-over-IP services.

The complete case study is available from Cisco Systems at their web site: <http://www.cisco.com/warp/public/732/Tech/nmp/saa/customer.shtml>.

# Strategic use of OSS boosts the bottom line

## ► Cover story

Telecommunication CEOs are setting extremely aggressive goals to increase profits while cutting costs by as much as 30%. The entire industry is being forced to streamline, and as companies regroup to drive down costs, their network infrastructure and management systems are being consolidated.

Although no single strategy exists for achieving these goals, the direction from the top is clear: Cut costs by streamlining, automating, and simplifying operations. Accelerate revenue growth by deploying new services quickly and keeping customers happy. Ensure a quick return on every investment. And protect the business by making sure that the network and services are secure.

Through the integration of network and service management, operational support systems (OSS) will play a critical role in providing telecommunication companies with the results they seek.

## Agilent's OSS strategy

Agilent has OSS offerings installed in more than 200 service provider companies in more than 120 countries worldwide. A recent RHK Insight report lists Agilent as number one in Service Assurance revenues worldwide. In our eight years in the service assurance business, we have developed substantial domain expertise and experience in helping our customers control their operating expenses and increase their service revenues, and we have done it on a worldwide basis.

Now we are taking our OSS strategy to the next level to align with our customers' changing needs. First, we are enhancing and extending our existing point solutions to provide new value-added capability. These systems (highlighted earlier this year in *Telecommunications News*) include the industry-leading accessSS7 signaling monitoring solution, accessFIBER optical network planning and management system, NgN Analysis System for deployment and troubleshooting of voice-over-packet (VoP) networks, Firehunter service assurance and

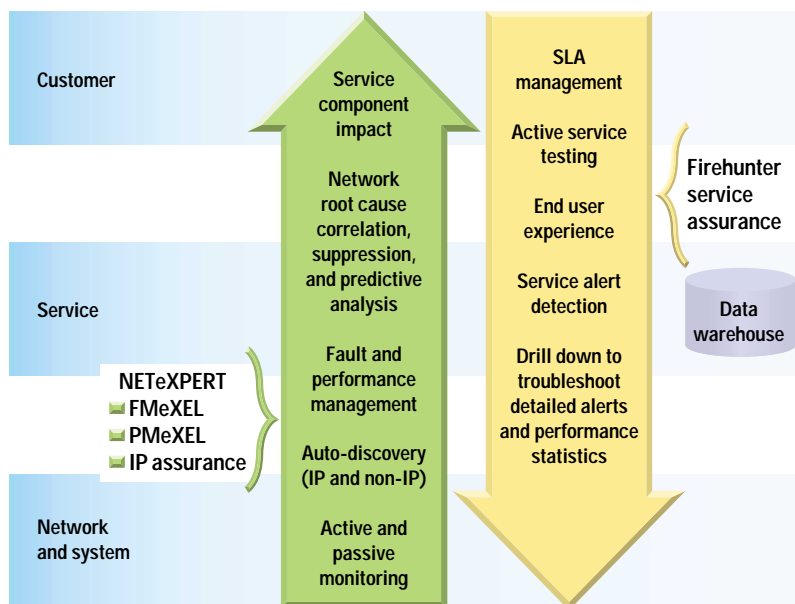
SLA management software, and NETeXPERT family of fault, performance, configuration, and accounting management solutions for wireline, wireless, and IP networks.

Second, we are continuing to convert our point solutions into modular system components that interconnect and provide a foundation for building whole-product solutions that are integrations of each of these components. An example of a modular solution for service assurance is described later in this article.

Third, we are creating "pre-integrated" systems to solve specific problems that affect the deployment of next-generation services such as GPRS, 3G, and VoP.

Fourth, we are expanding our professional services to help service providers incorporate Agilent solutions into their existing operations.

By providing critical solutions that can be integrated tightly into existing environments, Agilent is helping service providers manage their networks and services more efficiently and cost-effectively.



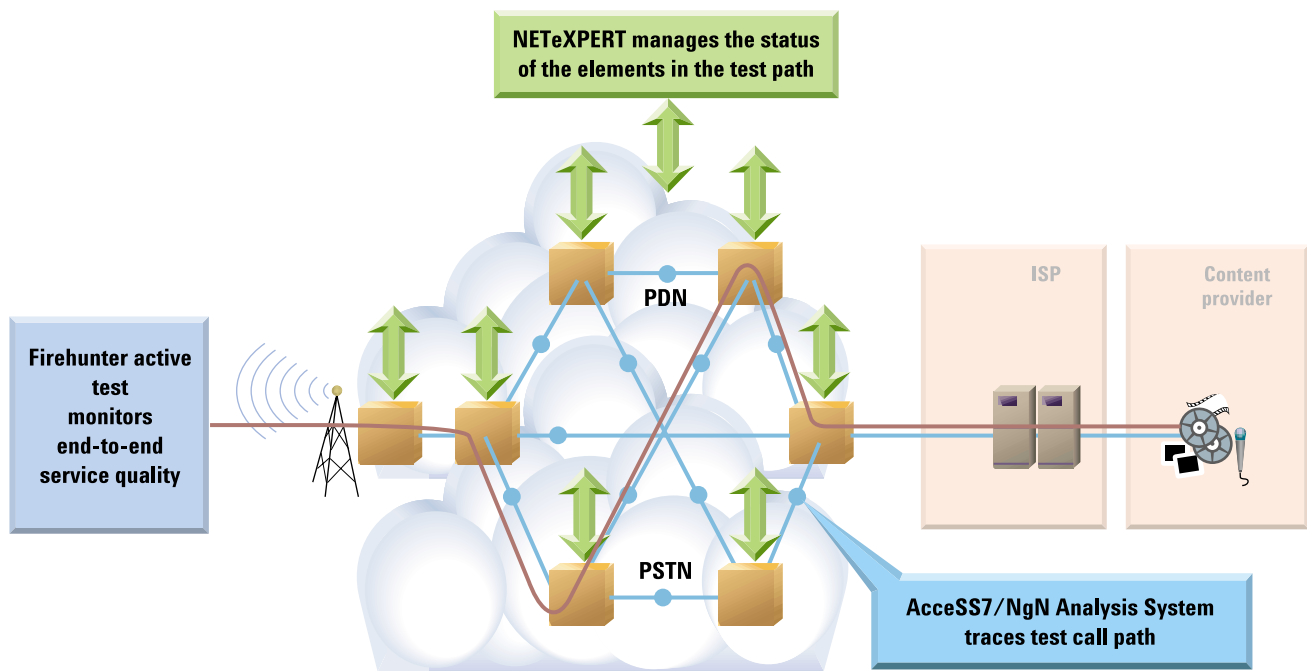
*Integrated network and service management enables a top-down, bottom-up approach to problem analysis and troubleshooting.*

## Complete service awareness

Most service providers are wrestling with complex, hybrid networks that old-style OSSs don't support very well. To stay profitable and competitive, they want to expand their service offerings and provide better customer care. But they are lacking an integrated view of network performance and knowledge of how customers are experiencing the service. If an event occurs on the network, they often have a hard time determining whether that event is causing a service problem (such as degradation or outage), and if so, which customers are being affected.

To overcome this barrier, Agilent has introduced the industry's first modular, integrated OSS solution for network and service assurance. This solution combines Firehunter ser-





Combining Agilent's network and service management solutions creates a powerful OSS for hybrid networks.

vice management software with NETeXPERT-based fault, performance, work-flow, and IP assurance software. This powerful combination provides a network-wide view and complete service awareness for wireless and wireline, switched and packet-based networks.

Firehunter allows service providers to proactively manage service levels and SLAs through continuous service monitoring from the customer perspective. NETeXPERT collects information directly from the network elements. All the data collected is extracted and warehoused in an integrated database. Data management tools help service providers make decisions based on the information, and business processes—for example, what actions to take if a fault is discovered—can be triggered. All the activities can be linked together in a work flow to automate these processes.

#### An integrated approach to problem-solving

The integration of service and network management enables a unique top-down and bottom-up approach to problem-solving. Service providers can start at the top—at the

service level—and drill down to correlate service quality with the underlying infrastructure components and take proactive steps to avoid service quality deterioration. Or they can start at the bottom—with the underlying infrastructure components—and look upward to see how infrastructure issues affect service quality and which customers have been affected.

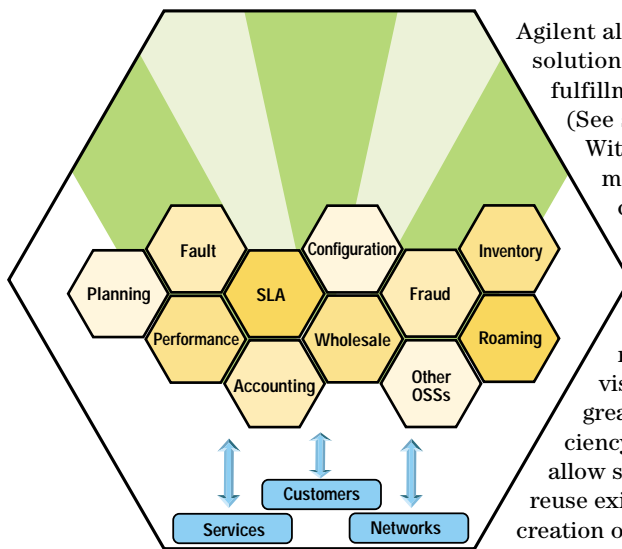
To better understand the value of this approach, imagine that an event storm occurs in an operations center at 2 a.m. on a Sunday morning. Network alarms come flooding in, and operations center personnel must decide whether or not to dispatch a technician in a truck to troubleshoot the problem—a costly proposition at that hour on a weekend. But with Agilent's integrated service and network assurance solution, the operations center personnel can look at the services supported by the troubled part of the network to see whether those services are behaving correctly. By determining that the problem does not affect customer quality of service, they can put off sending a repair truck until normal business hours on Monday.

Eliminating unnecessary truck rolls can have a significant impact on a service provider's bottom line. If an average truck roll costs \$75 US—and we've heard everything from \$50 to \$1500 per dispatch—and approximately 30% of all truck rolls are unnecessary, a service provider who makes 50,000 dispatches a year could save well over \$1 million.

#### Enhancing ROI

Agilent's integrated network and service solution enhances a service provider's return on investment in several ways:

- *Increased customer satisfaction and reduced customer churn*  
Service providers can quickly detect, prioritize, and fix problems before they affect the customer experience or violate SLAs. The enhanced monitoring capabilities also allow service providers to attract and retain customers by offering strict and enforceable SLAs at minimum financial risk.
- *Reduced operational costs*  
This solution can automate operational processes such as SLA management and filter thousands of network alerts per second so that tech-



Agilent also provides modular solutions to manage service fulfillment and billing. (See sidebar, this page.)

With the service fulfillment solutions you can capture, control, and automate service delivery processes, including management of your inventory. These processes are visually depicted for greater operational efficiency. Drag-and-drop tools allow service providers to reuse existing tasks to speed the creation of new processes and the deployment of new services.

*Modular components are "pre-integrated" and work together to create a powerful OSS.*

nicians can focus on a critical few. The comprehensive view of customer experience, services, and network health allows more cost-effective decisions to be made.

- *Revenue growth through productive use of assets*  
Comprehensive data warehousing provides a way for service providers to collect, manage, and mine network, system, and service performance information. This information can be used in forecasting network growth and in redirecting under-used assets to generate more revenue without increasing capital expenditures.

#### **Proven network and service assurance solutions**

The integrated service and network management solution is part of Agilent's comprehensive suite of open, modular OSS offerings that support today's and next-generation network architectures, helping to improve levels of performance, reduce fault resolution times, and enable new, value-added services. They also can help generate new revenues by providing comprehensive network, service, and customer information to sales, marketing, fraud, and wholesale billing departments.

When service usage data is collected and used effectively, it becomes a strategic resource for increasing operational and competitive efficiencies and for generating additional revenue. Agilent's service billing solutions capture and convert usage data to strategic information for a number of revenue-enhancing applications: detecting fraud, billing for traffic not currently recorded, negotiating fairer interconnect and roaming agreements, analyzing products and customer behavior, and monitoring interconnect traffic and types.

#### **Delivering the total solution**

To deliver a total solution and provide ongoing support, Agilent provides business and technical consulting, project management, educational services, and worldwide product support.

For more information about Agilent's OSS products and services, visit us on the Web at [www.agilent.com/comms/oss](http://www.agilent.com/comms/oss) or check 1 on the reply card.

## **Manage costly inventory and provisioning processes with help from Cramer Systems and Agilent**

Agilent has teamed with Cramer Systems Inc., a leading provider of inventory management and provisioning applications, to automate the tedious and inefficient manual tasks that add cost and uncertainty to service fulfillment and assurance processes.

Award-winning software from Cramer presents and maintains an accurate inventory of network assets and capacity. The software matches incoming customer orders to network resources and automatically selects the best assets available for order fulfillment.

Cramer's proven applications will be sold as part of Agilent's OSS portfolio of service assurance and fulfillment software. Together, these products lay the foundation of an automated, expandable solution to reduce operational costs, eliminate and defer capital expenditures, and roll out new services quickly. For example, with automated delivery systems, service activation times can be reduced significantly, in some cases from weeks or months to a matter of hours. This ability will go a long way in enhancing customer satisfaction.

More information about Cramer Systems applications is available at [www.cramer.com](http://www.cramer.com).

Learn more about Agilent's OSS solutions at [www.agilent.com/comms/oss](http://www.agilent.com/comms/oss).

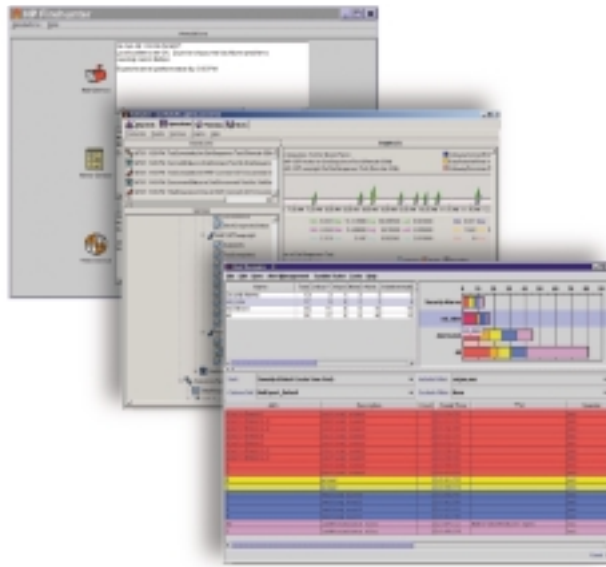
# A closer look at Agilent's integrated network and service assurance components

Agilent's modular, integrated service assurance solution is based on the NETeXPERT VSM framework. This open, flexible OSS framework allows you to create and integrate essential service and network management functions—fault, configuration, accounting, and performance—independent of vendor, standards, and technologies. You can create new applications faster with reusable components, form-based editors, and graphical user interfaces, and you can integrate cross-domain applications to share data and processing for end-to-end management solutions.

NETeXPERT VSM is the open, scalable framework upon which many of Agilent's streamlined service fulfillment, service assurance, and service billing solutions are built.

Service level monitoring and management is made possible with Firehunter, Agilent's popular Internet service assurance software. Firehunter gives you a customer's perspective of service performance, based on numerous powerful features:

- Real-time, end-to-end service and SLA management, plus automated reporting
- Problem alerts, drill-down capabilities, and fault isolation
- End-user response-time monitoring and resource planning support
- Insights that help you maintain top performance, availability and quality of service (QoS)
- The ability to integrate data from other management tools
- Tightly integrated with Firehunter is IP Assurance, which adds



*NETeXPERT and Firehunter software are key components of Agilent's OSS solutions.*

features for end-to-end monitoring of service quality and service level agreements (SLAs):

- Efficient management of systems, hosts, applications, and networks to speed time to market
- Trending and performance analysis tools, reports, and data management for any SNMP device to make best use of infrastructure and resolve problems before customers are affected
- Management of duplicate IP addresses to avoid IP address collisions in customer networks
- Distributed auto-discovery of devices beyond corporate firewalls for increased operational efficiency
- Support for diverse, multi-vendor network environments

Fault management is enhanced by FM eXEL, which can detect and isolate network problems automatically for quick resolution. Using filters, suppression, thresholding, escalation, and correlation, the fault manager helps you respond effectively to

message storms—reducing mean time to repair, improving fulfillment rates for SLAs and reducing your costs.

- A single interface for monitoring faults through NETeXPERT VSM clients
- Environment for building interfaces to new network elements
- Administration of new policies to manage incoming events
- Support for diverse, multi-vendor network environments

With PM eXEL, Agilent's solution for performance management, you can avert performance problems before they affect services and you can improve quality of service:

- Real-time performance exception reports and data storage for analysis with live and historical modes
- Network monitoring with views of traffic congestion and long-term performance trends including graphical wireless reporting (GWR)
- Flexible reporting tools that can be customized for service assurance applications
- Monitoring of historical and live performance measurements and thresholds
- Ability to combine element, network, and service component measurement data for better view of performance impact
- Support for diverse, multi-vendor network environments.

For more information, visit our Web site at [www.agilent.com/comms/oss](http://www.agilent.com/comms/oss).

# Where does the communications industry go from here?

## An interview with Keith Willetts

Keith Willetts, founder and principal of consulting firm Mandarin Associates Ltd, is widely recognized as a leading authority on communications management. Willetts is a co-founder and Chairman of the Board of Directors of the TeleManagement Forum ([www.tnforum.org](http://www.tnforum.org)). Previously he held executive positions at BT and TCSI, and he co-authored the book *The Lean Communications Provider*. Willetts has twice been named one of Communications Week's "Top 25" industry visionaries, and he has been given the British Computer Society award and the BT Gold Medal.

Willetts recently shared his thoughts on how the telecommunications industry can return to profitability and the increasingly important role of OSS.

*Telecommunications News:* A few years ago you wrote that market economics would force the telecom industry to transform itself much as the automobile manufacturing industry had to do in the 1980s. What are your thoughts about this now?

*Willetts:* My book coined the term "lean communications" and preached a message of the need for ultra low costs coupled with maximum flexibility and customer service. Although my beliefs haven't changed these last few years, the times certainly have. In 2000 we were riding the wave of the dotcom boom and being told that the Internet had changed the laws of economics forever. Of course, reality caught up, and now we are in a downturn that is unlike anything I've seen in 34 years in the industry.

But the recession in telecom is rather a self-inflicted wound. It's not as if we were in the whale-oil business—people are still using communications services and, in terms of volume, the trend is strongly upwards. There are more users, more Internet traffic, and more bandwidth, access, and mobility. Why then the downturn? The answer is a simple law of economics: supply has outpaced demand, to the extent that there is a glut of capacity. Prices have fallen, and operators have sharply reduced capital spending. That's put many of the equipment suppliers into a deep recession. But operators, too, have to make real changes in the way they do business, since, according to a recent McKinsey/Goldman Sachs report, that excess capacity will cause prices per bit to fall at rates of 20-25% per year. To stay solvent, telecom operators will have to cut their costs at least as fast.

It can be done. Moore's law taught the semi-conductor industry to gear up for continuous falls in price by continuously reducing the cost base in line with price declines. Profitability requires understanding how to exploit economies of scale and manage production costs.

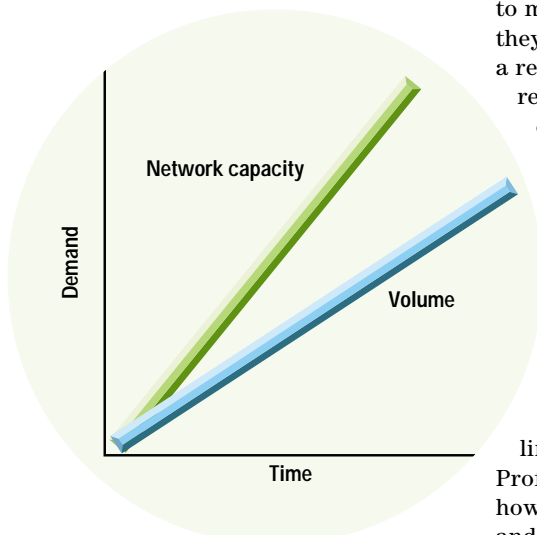


*Keith Willetts, founder and principal, Mandarin Associates Ltd*

To translate this to the telecommunications industry, if prices really do fall as fast as predicted, the situation demands far more than an improvement in the existing business model. It requires a radically different approach to business, not unlike the 1980s revolution in car manufacturing when Toyota rewrote the rules, delivering a level of production cost combined with quality and flexibility that most in the West claimed was unobtainable.

There wasn't a need in the telecom industry for an equivalent to the end-to-end streamlined processes, high levels of automation, and highly flexible production methods that transformed automobile manufacturing. In fact, the US regulatory environment positively discriminated against efficient, low-cost operators until the end of the '90s.

That's all changed, and now that the underlying economics of communications are staring us in the face, there's little alternative but for a sustained drive to cut operating costs while achieving genuine and new value from services—in other words, to adopt the lean communications approach.



*Network capacity has exceeded demand.*



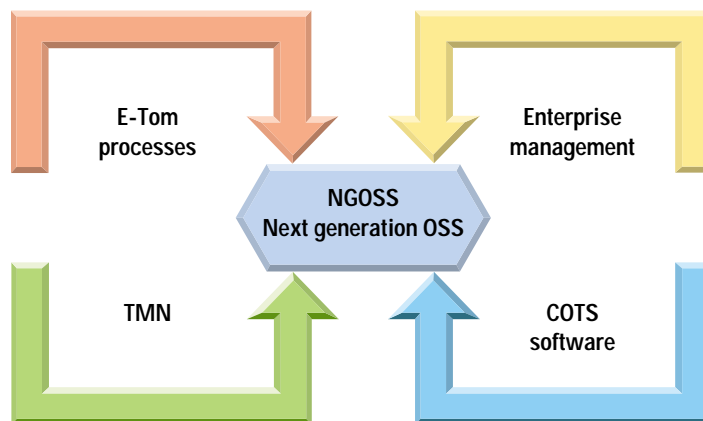
*Telecommunications News:* So how do we begin this transformation?

*Willetts:* That takes us to the need for automated business processes and communications software for OSS and BSS (business support systems). Telecommunications is evolving from a highly manual to a highly automated world. Thirty years ago, billing was done by photographing electro-mechanical meters and transcribing the data onto punched cards! Today, such inefficiency would be unthinkable, but in reality, the nature of the telecom market has meant that process automation has been slower than in industries such as retailing, banking, and manufacturing. Now it's catch-up time—the integration and automation of operational processes through advanced OSS and BSS systems has the potential to deliver a very large percentage of the cost cuts.

Industry analysts are pointing to a significant boom ahead for communications software. As they have reported, communications software is part of the solution, not part of the problem. But OSS and BSS has just begun to emerge as a real business. Ten years ago, it was a cottage industry in the telco labs, with the majority of investment going into internal, custom software projects. Last year, there were more than 200 software companies delivering OSS and BSS products.

We mustn't lose sight of the basic purpose of this industry, which is to deliver to operators the capability to run their networks at ever lower costs, with increasing business flexibility and extraordinary levels of customer service. Frankly, operators have not been getting the solutions they need to transform their busi-

nesses. That's because the industry has tried to produce flow-through, automated processes from a huge number of fragmented and dissimilar systems—rather like assembling a giant jig-saw puzzle in which all of the pieces are of different shapes and sizes and won't fit together. I'm not referring just to the legacy base—we continue to install new systems in piecemeal or haphazard ways, and at least half of the investment is going into trying to achieve basic integration.



*Industry agreement on a next-generation OSS will ease the burden of the integration tax.*

*Telecommunications News:* What is the cause of all this fragmentation?

*Willetts:* When I worked for an operator, I thought suppliers wouldn't work together or follow standards because they wanted to lock the operators into a proprietary approach.

But working for a software vendor, I saw the other side. Operators want something different, too. They've spent a long time buying and building custom solutions that fit their processes, and they are used to asking not just for minor implementation changes, but often for fundamental design changes in databases, operating systems, interconnection architecture, and so on. Suppliers end up with "markets of one" for their products, and these very small markets do not produce the kind of profits needed for sustained product investment.

At one time the industry might have had enough profit to sustain this scenario, but the laws of economics are not going to allow the standoff to continue much longer. The imperative to slash costs is going to override any debates on object models and meta-schemes!

*Telecommunications News:* What solution do you propose?

*Willetts:* I would like to see the industry take four actions.

First, operators begin to speak with one simple and clear voice to suppliers, telling them "this is what we want, this is when we need it, and this is how much we are prepared to pay." If a few large operators begin to issue RFPs calling for common standards and common minimum functions and capabilities, the supplier community will fall over itself

to comply. We saw that this happen with the TeleManagement Forum's Mobile Common Configuration Management Catalyst project, which developed a solution for the wireless industry that allows handovers from 3G to 2G cellular networks. Four operators signed a common requirements specification and we went from concept to demo in six months, and from demo to product in another twelve.

Second, suppliers must accept the fact that there will be implementation differences between operators. Even if operators want to run their networks and services using standard processes, their legacy base will hold them back. The most successful suppliers understand that they have to build products that can be easily configured—and not by rewriting code for every installation. Suppliers must create a set of simple configuration tools that allow rapid tuning of the system to meet

their customer needs and an open set of interfaces that allow customers to add unique, value-added features.

Third, as an industry we've got to rid ourselves of the crippling burden of the integration tax. Integration doesn't just cost operators tens of billions of dollars—it takes time, imposes risks, and produces poor levels of functionality and rigid inflexibility that are causing serious harm to operators' businesses. There is one way to get out from under this burden, and that is for the industry to agree rapidly on an integration framework, operators begin specifying this framework in their procurements, and suppliers start supporting it in their developments. We even have the vehicle for agreement. The TeleManagement Forum—which has members from every continent and every sector of the industry—has a major program to define appropriate standards and frameworks. It's called NGOSS, which stands for next-generation OSS. But an industry group can only propose solutions, in the end it's the members who must act. And right now the communications industry needs solutions that deliver, not endless debate over minute points.

Finally, we must communicate to the decision makers in our organizations the importance of a clear, focused, and coherent investment approach to operational systems. For too long OSS and BSS technologies have been an after-thought to massive network investments. For

too long, we've invested in piecemeal fashion and we've been driven by technology, not business models. Yet the key to business success lies in the way we run our business, down in the operational processes.

*Telecommunications News:* So it's the economics that will get us moving in the right direction?

*Willets:* If money makes the world go around, it's the financial drivers currently at play in the industry that will at last force cohesion around a common approach. We simply cannot go on wasting vast sums of money and time on poor levels of process integration. Suppliers can't go on being fragmented cottage industries bumping along on low revenues and profits.

To fuel the engine behind next generation networks and services, we have to break from the past. Competitive advantage does not come from a systems infrastructure that's custom-built. It comes from delivering excellent customer service, excellent service quality, fast reaction, and efficient operations.

I truly believe that a leaner, meaner, and much more effective communications industry will come out of this recession. And communications software can emerge as the solution that enables lean and mean operators to exist. But there are still many challenges ahead. It's time to get seriously engaged in overcoming them. ●

## Multimedia seminar on OSS

Keith Willets, chairman and founder, TeleManagement Forum, and Matt Izzo, manager of OSS architecture strategy, Agilent Technologies, co-present a seminar on "The New Era of Operations Systems and Software." This multimedia seminar introduces the new-generation OSS (NGOSS) and describes its key architectural principles. It also discusses important OSS architecture trends and the need for integrated OSS solutions.

The seminar is part the iForum program sponsored by the International Engineering Consortium (IEC) and is available on the IEC's Web site at [www.iec.org/online/iforums/sessions.html](http://www.iec.org/online/iforums/sessions.html).

You must register to view the iForum; however, access to the seminar is free.

The IEC's iForums provide reliable, authoritative, and noncommercial perspectives on current technology topics and applications for communications professionals. Each iForum seminar consists of a 60- to 90-minute session presented by two or three leading industry experts. These experts give insight on key technology topics using streaming audio and video, PowerPoint slides, and other, interactive media.

# Wireless OSS gets next-generation services up, running, and under control

Faced with high penetration rates in the mobile phone market and falling prices for voice service, wireless service providers are betting the future on high bandwidth data services and are moving forward to deploy 2.5 and 3G networks. With restless analysts and stockholders looking over their shoulders, many service providers feel that within months they need to get services up, running, and profitable.

The magnitude of change in moving from a voice-oriented, fairly well understood switched network to a packet-based network (3G) or network overlay (2.5) cannot be over-emphasized. Rather than point-to-point connections, the network will be managing connections to content servers than can be located just about anywhere. For example, if a user in San Francisco places a call to check his stock prices, that call must go through the air interface to the base station, get put onto a packet network, and be transported to a content server, perhaps in Seattle.

The question then becomes, how can a service provider guarantee that the call will be properly routed to the content server and that the content server will provide the correct information? How can the service provider assure the quality of that service? (If the user is roaming, that adds even greater complexity to the answer.)

In the packet-switched world, the complexity of the technologies and services brings new types of problems that wireless service providers have not had to deal with before. If a subscriber's e-mail is slow, what is causing the service degradation? Are there too many users at the air interface? Or too many on the network itself, causing latency? Or does the problem reside at the other end, with the content provider?

*The acceSS7 Call Trace and Protocol Analysis tools have been enhanced to cover GPRS networks.*

Subscribers who have become used to a stable, higher quality voice service in recent years will be expecting to receive the same for data.

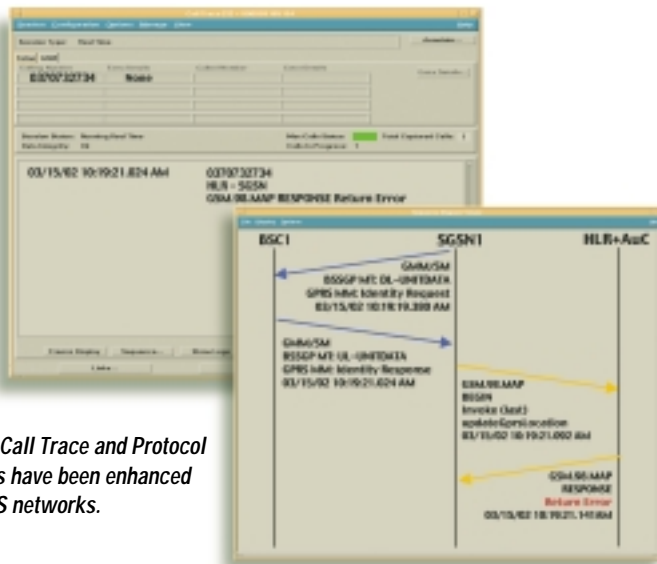
**Service assurance provides answers**  
Agilent is enhancing and integrating its proven OSS service assurance solutions to provide the tools that service providers need to deploy new networks, prove that services are operational, and ensure that quality of service is in place before the start of mass subscription. Our OSS service assurance tools offer unique insight into the network from the element layer up through the services. Modular, integrated tools provide the ability to monitor at the essential points in the network and to pull all that data together in a way that provides a customer's view of the service as well as the link and element data needed to locate and resolve service quality issues.

By combining service level monitoring and management, link monitoring, and fault and performance management, Agilent's wireless service assurance solutions offer a holistic view of the health of the network and services. A data call can be traced from a mobile through the

elements of the wireless network (base station, base station controller, gateway and signaling nodes, etc.), and into the packet domain. Data from network elements, the signaling network, and the data service is brought together under a "manager of managers" to enable true service quality management.

Along with integrating its modular components to relieve service providers of that costly burden, Agilent has built its wireless OSS solutions in an open architecture that can be integrated with other OSS components deployed in the network. Data from all the OSS islands can be brought together under the manager-of-managers umbrella. For a complete end-to-end view, Agilent can even pull in and correlate data from the RF world captured by our comprehensive drive test tools.

The first wave of Agilent's wireless OSS solutions are being delivered for GPRS, which is nearing the stage of service roll out and will be the proving ground for the acceptance and success (that is, ultimate profitability) of next-generation services.







view and correlate measurement to the network data to determine the root cause of the problem. Similarly, if a change occurs within the network, they can look upwards to the service level to see how service is being affected.

In the wireless domain, however, mobility adds an additional complexity to service management. In a wireline service, if a problem occurs that affects a service, the customers affected are easily identified—their phone numbers are associated with a specific location. In a wireless network, however, customers can be anywhere. To track customers and trace calls through the network is far more complex. In this case, the signaling data provided by the acceSS7 component is vital to identify which customers are connected to the network and where they are connected.

#### **GPRS Session Analyzer**

A new GPRS Session Analyzer based on acceSS7 is a powerful troubleshooting tool that solves the problem of how to handle incoming reports of customer-service problems in call centers. Service providers have already reported a significant increase in the rate of calls coming from early adopters of data services. When mass subscription for GPRS services begins, that rate is expected to jump much higher. Since call centers as a rule are manned by non-technical personnel, the operations centers could be flooded with potential problems forwarded to them for resolution.

The Session Analyzer pulls together all the signaling and connection information gathered by acceSS7 and the user data content supplied by a partner solution from XACCT Technologies. This detail is integrated and then displayed at a very high level as a series of red or green “traffic lights.” A customer service representative handling a subscriber’s call can enter the subscriber’s phone number and pull up the session records. Successful sessions are indicated by a series of green lights, each light relating to a particular aspect of the service such as paging procedures or mobility management functions.

If a red light shows up at any point, indicating a problem, the service representative can quickly identify the source—for example, traffic congestion, a network fault, or a third party such as a content provider involved in the transaction. If the problem lies in the network, the service representative can then forward a trouble ticket to the operations center for further investigation. All of the underlying detail of the call session is automatically forwarded to the troubleshooter, who can quickly drill down to find the cause of the problem.

#### **Ongoing commitment**

Agilent will continue to provide innovative OSS solutions that keep pace with the deployment life cycle of next-generations wireless services. Our goals are to assist service providers in overcoming the challenges of service assurance and management in this complex new domain, and to ease the burden—financial and otherwise—of OSS integration by providing “pre-integrated” Agilent solutions that can be easily be connected in to an existing OSS environment.

For more information on Agilent’s OSS, visit our Web site at [www.agilent.com/comms/oss](http://www.agilent.com/comms/oss) or check 2 on the reply card.



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# A new way to keep up with traffic loads

Traffic on SS7 links continues to increase, even though the number of “traditional” telephones in service has stabilized in most parts of the world. This increase is being fueled by the growth of Intelligent Network services, Internet usage, and particularly wireless telephony. Network operators report that wireless interconnection now accounts for a high percentage of the traffic at their busiest tandems. As more and more calls are made from wireless phones, the signaling infrastructure of the operators who must handle the interconnection is being strained to keep up with the load.

Not too long ago operators could accommodate traffic growth by over-provisioning their networks. But in an era when capital money is tight, this approach is no longer a viable option. Operators are being asked to make do with their existing network assets—and to maintain and manage these assets with a much smaller staff. At the same time, operators are still obligated to meet the quality of service levels demanded by government regulations, inter-carrier contracts, and customer SLAs.

Further complicating the picture are the many changes being made to the existing network, as operators roll out new technologies and services with limited resources and try to make the network more secure.

## Need for detailed, historical information

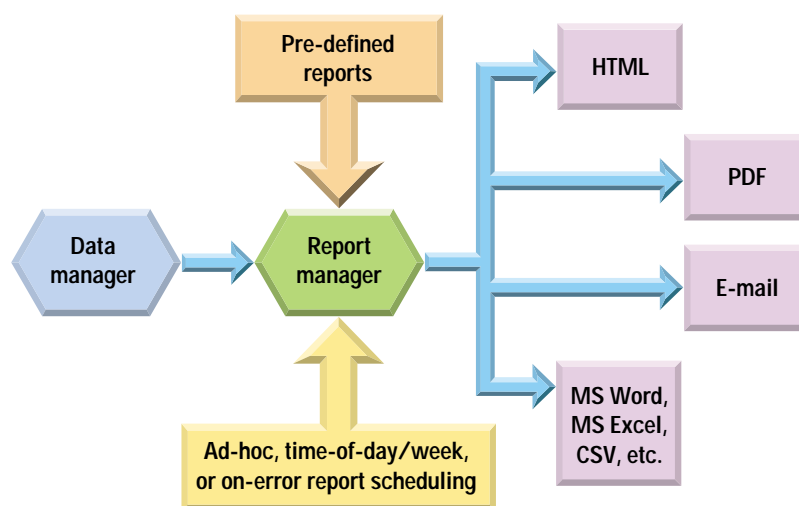
To determine whether network infrastructure can accommodate growth and change, network operators need exceptionally detailed information about the network’s behavior over time. Without this perspective, over-provisioned links may go unused while under-provisioned links go unnoticed—that is, until a major failure occurs.

Detailed SS7 reporting provides essential visibility into trends and the impact of changes on the network. Armed with aggregated historical data, engineering and planning teams can look across their entire network to determine how a change in one switch can ripple through to other parts of the network. Until now, however, obtaining that visibility has meant gathering data from spreadsheets or other documents containing information about individual links—and then manually analyzing possibly hundreds of those

documents, each with thousands of pieces of data. This job might take months, so not unexpectedly it often doesn’t get done. Rather, engineers generally pick only the most critical links and try to analyze that activity, hoping that nothing unexpected happens elsewhere in the network.

Agilent’s customers have told us that as they try to make the best use of every asset in the network, they need the ability to look across their SS7 network and understand the impact of alterations and events. But they don’t have the human resources to spend months gathering data; they want an “out-of-the-box” tool that will collect all the data automatically and then present it in a useful form for analysis.

To address this need, Agilent has developed the acceSS7 Management Reporter. This software product takes the data collected by the Agilent acceSS7 system, aggregates that data, and stores and formats it in a variety of customer-focused reports. With easy access to historical SS7 data, planning teams can more accurately determine when new network resources are needed and the required scope of the new equipment acquisitions. Delaying or scaling back infrastructure purchases results in immediate and significant capital expense savings. And with a better understanding of SS7 traffic, operations teams can use the data to quickly identify network hot spots and re-route or redistribute loads to less heavily used areas. Historical views of service quality and fault trends lets the operations management team measure and track service quality to improve customer service and QOS. As new services are rolled out, they can obtain reports of service quality and usage to help improve deployment efficiency and service marketing. The Management Reporter thus give network operators who have deployed acceSS7 in their networks the opportunity to get even more value from their investment.



*Management Reporter software aggregates and presents historical data in a variety of report formats.*



### Money-saving features—out of the box

The acceSS7 Management Reporter gathers statistical data about the entire network, not just a part of it, and keeps that data for as long as the operator desires. This information can be used in several ways that contribute to savings in operational and capital expenses while maintaining or improving service quality:

- Only a day or two after the software has been installed and data has begun to flow, different teams within the organization can use the pre-defined, out-of-the-box reports to capture and report metrics without having to spend a lot of time and effort.
- Historical reporting and storage provide insight into recurring events that might otherwise be missed and trend information. The flexible reporting structure allows teams to create custom reports if they wish.
- As an Agilent-developed and supported product, Management Reporter is pre-configured to work with acceSS7 and is supported by Agilent for long-term value.

Management Reporter uses the measurement tools that already exist in the acceSS7 environment, taking the SS7 data and transforming it for tasks such as aggregation of link sets, rate-of-change calculations, Top N reports, load distribution metrics, and forecasting. The flexible reporting structure allows users to generate a pre-defined report on the spur of the moment or at regularly scheduled intervals. Reports can be saved in popular formats such as MS Word, MS Excel, pdf, html, or e-mail, and formats can be chosen and changed with just a simple mouse click. Users don't need to be experts in graphics and file manipulation; they can focus their attention on working with and transmitting the data.

The screen captures above illustrate the ability of Management Reporter to calculate the monthly Top N from raw historical data stored in the Management Reporter database. By clicking on an area of interest on the graph, a user can drill down to successively more detailed information; in this case, the average link load by day, by hour, and finally at a specific minute. This drill-down

capability can save considerable time paging through reports to find the granular detail.

A separate screen capture reports the link-load trends. Link loads rise until a fix is put into place; then the user can check to see that the load has been reduced and holding stable, and the solution to the problem appears to be working.

### Easy add-on to acceSS7 systems

Management Report uses the proven technology of Agilent's acceSS7 and NETeXPERT OSS. Running Management Reporter requires an Oracle database and minimum of one computer located at the acceSS7 central server. Making use of the acceSS7 infrastructure, Management Report requires no other hardware at the remote sites or at the central server.

Current users of acceSS7 can put Management Reporter to the test with a free half-day of consulting or other special offers. Visit <http://ossresponse.comms.agilent.com/agilent>.

For more information on Agilent OSS, visit our Web site at [www.agilent.com/comms/oss](http://www.agilent.com/comms/oss).

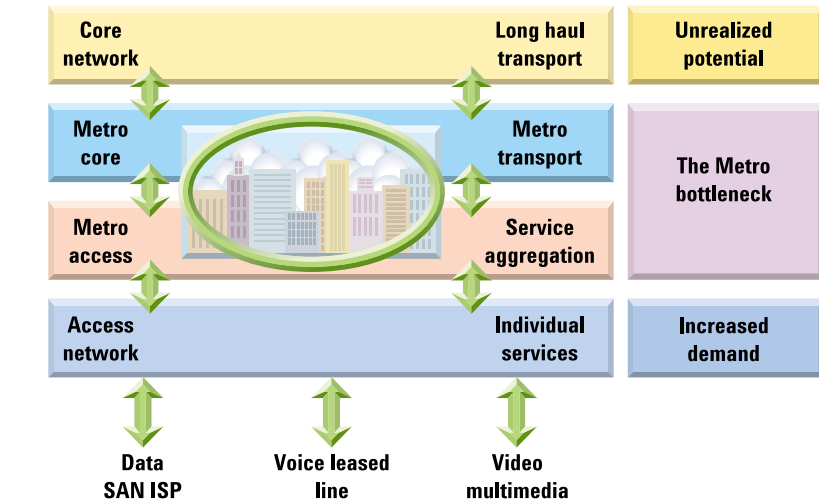
# Overcoming bottlenecks in metropolitan networks

Periodically bottlenecks arise in the telecommunications network. A few years ago, the exponential growth of Internet traffic seemed likely to overwhelm the resources of long-distance carriers. This led to an unprecedented expansion of the core network, with approximately 10 million miles of new long-haul fiber installed worldwide. Intending to get capacity ahead of the demand curve, the industry in fact over-built the core network. Of the high-capacity fiber now installed, it's estimated that just over 20% is lit today, and of that lit fiber, less than half is being used. Even though the amount of network traffic continues to grow, analysts predict that it will be several more years before the excess fiber capacity is absorbed.

At the same time that the core network was being expanded, local exchange carriers were beginning to upgrade access networks with higher bandwidth technologies, including xDSL, cable modems, next-generation wireless, and—for enterprise access—gigabit Ethernet (GbE). Less investment was made, however, in metropolitan area networks, which now have become the source of bottlenecks as data traffic increases at both the access-network and the core-network edges.

Today a mismatch of capacities and capabilities impedes full use of the core network. To make matters worse, network traffic patterns are changing. Greater demand for locally generated Internet content and local data-storage service is keeping more and more IP traffic within metro areas. Whereas a few years ago some 80% of data traffic was carried over the network core, in the future the situation may be reversed and that same percentage of traffic remain in the metro area.

The challenge for the industry now is to expand metro area networks to accommodate bandwidth demand and access. Given the current economic climate, investments will be made cautiously, and carriers will be looking for solutions that help lower the



*Mis-match of capability at the core and metro network edge impedes full use of bandwidth.*

unit cost of transporting voice and data while facilitating deployment of new revenue-generating services for a better return on investment.

## Where technologies converge

Delivering services is far more complex in metro area networks than in the core network. Today, most voice and data traffic is carried on SONET or SDH rings, which are efficient for voice traffic but significantly less so for bursty data. Adding complexity are the many technologies that converge within metro area networks for transporting services and for providing connection to the access and core networks. Numerous varieties of transport equipment can be found, including add-drop multiplexers, digital and optical cross-connects for switching traffic, and DWDM terminals. Equipment often comes from different manufacturers and may not interoperate very well. Add new mapping structures, gigabit Ethernet interfaces, and the many protocols for control and delivery of differentiated services—and the metro mix becomes extremely difficult and costly to manage.

To alleviate the metro bottleneck and simplify network management, equipment manufacturers are consolidating the functionality of different network elements and protocols onto single devices known as multi-service provisioning platforms (MSPPs).

Transport MSPPs perform the function of traditional SONET/SDH network elements, but also support granular and dynamic bandwidth provisioning such as virtual concatenation. These devices provide direct mapping of native data interfaces into SONET/SDH channels, and the newest ones have started to offer Generalized Multi-Protocol Line Switching (GMPLS), dynamic provisioning, and basic traffic engineering functions.

More revolutionary are the routing MSPPs, which are a new generation of packet-sensitive metro-edge IP devices. Packet-based MSPPs are predicted to save carriers money in new infrastructure investment over the long term—for example, by connecting Ethernet switches directly over fiber to avoid the added complexities of encapsulation with SONET/SDH and ATM—although many carriers at the present moment may be reluctant to make the initial capital investment required to upgrade to this class of equipment. Consequently, most industry analysts believe that network operators will need to support SONET/SDH and other legacy infrastructure for a number of years to come.

The metro network is expected eventually to have fewer layers, reducing both the levels of encapsulation in the protocol stack and the diversity



of equipment and interconnections that add to capital and operating costs. Network equipment will continue to embrace a wider range of functionality, and with the adoption of Ethernet and MPLS, some functions that have been implemented in hardware will instead be activated through layer 2 and layer 3 software.

### Test requirements

The consolidation of technologies and protocols within metro devices will make the network easier to manage, but it will also increase the need for testing. As racks of equipment get replaced by a single shelf of next-generation products, the new equipment will feature extremely high port densities, complex switching backplanes, and new aggregation and grooming mechanisms used to pack data and voice more densely into signals. New and immature standards will be implemented. The potential for interworking and other problems will be high.

Equipment manufacturers will need to stress-test devices to verify functionality and performance, and carriers

will need to ensure that equipment is operating efficiently in their networks to deliver services without compromising quality. This includes testing and monitoring the many interfaces between the provider edge and the customer edge of metro networks, where managed services and service level agreements are enabled.

As a leading supplier of optical test equipment, Agilent offers solutions focused on the emerging requirements of the metro area network, with new test and monitoring capabilities for SONET/SDH, carrier-class Ethernet, MPLS/GMPLS, DWDM, and intelligent optical network. Four new products are aimed at different stages in the lifecycle of the next-generation devices. They will help manufacturers and carriers alike improve time to market and time to revenue:

- **OmniBER XM** network simulator is the first tester to offer real-world



*OmniBER XM*

transport network simulation capabilities—multi-channel, multi-port, multi-rate, and multi-user—that redefine system verification and testing of the latest metro-edge products. Users can re-create network conditions with realistic traffic structures and test simultaneously on all ports and channels.

- **OmniBER OTN** communications performance analyzer now tests the enhanced SONET/SDH equipment



*OmniBER OTN*

that carries gigabit Ethernet traffic. It is the first product with Ethernet over SONET/SDH (EOS) mappings and OTU-2 jitter testing. Generic Framing Procedure (GFP) and Link

## Trade in today and save!

Today, budgets may be limited, but the need for testing hasn't gone away. Networks continue to grow in size and complexity, and you need to ensure the availability and quality of customer services. More than ever, downtime is not an option.

Agilent's transmission test sets help reduce the cost of test without compromising quality.

Now you can receive a credit of **up to \$40,000 (US)** when you trade in your old equipment for a new Agilent transmission test set.

### Get the features you need to save time and money in the field

- Unique all-channel monitoring—monitor up to 192 channels simultaneously



*Portable transmission test set*

- All rates and mappings under one handle—from 1.5 Mb/s to 10Gb/s
- Powerful diagnostic measurements, including APS and pulse mask
- Compact, rugged, reliable design
- Complete on-line help manual
- Flexible remote control for constant access
- Signal-structure and traffic-status displays
- Continuous, real-time network performance displays

- Help in identifying and resolving network issues
- Path list and search tools to verify correct path routing
- Much more!

### Learn more about this offer

For more information about the trade-in program, visit our Web site at [www.agilent.com/comms/im-tradein](http://www.agilent.com/comms/im-tradein) or call 1-800-829-4444 extension 4865. (Outside the U.S., please call your local Agilent sales office.)

Access Protocol for SDH (LAPS) mappings with gigabit Ethernet payload structures at 2.5 Gb/s have been added, and high accuracy jitter testing is offered to 10.71 Gb/s.



*RouterTester 900*

- **RouterTester 900**, Agilent's second-generation platform for comprehensive router testing, has been enhanced with a new dual-port, OC-3c/OC-12c ATM interface; single-port 10 GbE LAN interface; and Generalized Multi-protocol Label Switching (GMPLS), MPLS-VPN, IP multicast, and Ipv6 testing capabilities. The system scales to provide real-world metro testing and has unmatched port density.

- **Portable Transmission Test Sets** have been updated to include coverage for gigabit Ethernet. This product family is designed to test the latest aggregation platforms, reduce installation and maintenance test time, and decrease the overall cost of test. (See Telecommunications News, issue 23.) The updated Test Sets help network operators install gigabit Ethernet capabilities over existing SONET/SDH networks. They are easy to use, cost-effective, and built with the future in mind. That translates into extreme improvement in productivity—with no extra head count and a lower cost of test.

For more information on these and other Agilent products for metro testing, please visit our web site at [www.agilent.com/cm/metro](http://www.agilent.com/cm/metro) or check 3 on the reply card.

## The perfect fit: Equipment designed for optical-network field testing



*This modular test set is tailor-made for testing in outdoor and indoor environments.*

Technicians who install and maintain fiber networks are the unsung heroes of the optical Internet. Working from depots or garages, these installation and maintenance experts are assuming greater responsibility for the support of networks that are growing at levels unthinkable just a decade or two ago. Technicians are being asked to do more tasks, more quickly, without compromising the quality or integrity of the network.

A typical workday often begins well before sunrise, with the technician on the road with a truck full of gear. The day's first job might be to commission a fiber-optic cable that will carry 2.5 Gb/s IP traffic on each fiber—and the cable has 864 fibers to test, each at two different wavelengths. The job needs to be finished as soon as possible, because customers are waiting to be connected. The next day, the technician could be asked to visit any number of locations to verify cable installations or to troubleshoot problems and make repairs.

Many aspects of fiber-optic testing can impede the technician's efficiency—spending time on simple or

repetitive tasks that could easily be automated; lugging around bulky equipment designed for an R&D lab; or driving from location to location to run tests that could be done more efficiently from a central location.

But if the measurement tools required for the job are designed from the start to meet the technician's specific needs and environment, many of these difficulties can be eliminated. When the work is easier, it can be done more quickly and with fewer mistakes. Furthermore, a tool optimized for technicians is more cost-effective. Even a small improvement in efficiency can result in huge savings.

In the case of the 864-fiber cable, by cutting the time of each measurement from 75 seconds to 10 seconds, a job that would have taken days before now takes hours—a significant savings in time and money. Moreover, large network operators who receive hundreds of thousands of fault reports a day may need to send technicians to investigate tens of thousands of the calls. Preventing only a single percent of these truck rolls could save tens or

even hundreds of thousands of dollars. Technician and network operator benefit from the improved productivity and faster ROI.

### Translating the need to a solution

The only way to learn what kind of tools will really help technicians work more effectively is to spend time with them in their work environment. That is what Agilent did in designing its new Modular Network Tester for optical networks. Product design engineers spent weeks traveling with and standing beside (or in some cases over or under) the people who actually use the tools that measure mission-critical fiber networks. Hundreds of potential users were interviewed.

Network technicians are experts at understanding and communicating the bottlenecks and headaches of installation and maintenance testing. But it's up to product designers to translate these insights into effective new solutions within a product.

Agilent's team discovered that a "perfect fit" for fiber-network testing is a product with the following characteristics:

- A way to hold the equipment comfortably for hours, without needing to put it down
- Readily accessible, built-in help that eliminates searching through manuals, which are often lost
- Batteries that last longer than the immediate task at hand
- Measurement speed that radically reduces the time required for high-fiber-count jobs
- Measurement accuracy and artificial intelligence that eliminates having to do a job over again because of mistakes
- A common look and feel among the tools needed for testing
- A single product to carry or ship only what is needed at that time.



*The Modular Test Set speeds installation and maintenance of optical infrastructure.*



Agilent used these findings to produce a tester that is tailor-made for today's fiber-based long-haul and metropolitan networks. Particular care has been given to measurement speed, work flow, and ergonomic considerations.

### Setting new standards

The Modular Network Tester is a portable, lightweight, and rugged optical test platform that sets new standards in installation and maintenance testing. The tester covers a wide range of needs and works with optical time domain reflectometer (OTDR), loss, optical spectrum analysis, and dispersion measurement modules. These modules snap on to a slim, standard front end with an advanced user interface, so technicians won't have to lug a partially filled chassis into the field. The modular approach also simplifies training, since the user interface is consistent for all measurements, all connections, and all management tasks.

The tester has a touch screen, user-definable soft keys, and a patented navigation key. A video microscope lets technicians make quick inspections of optical connections with total eye protection from the laser.

Many other features are included:

- The shortest possible test cycles for commissioning, acceptance testing, and maintenance of optical infrastructure

- A 1 x 12 port optical switch for ribbon-fiber testing
- Ergonomic features including an "ergo grip," pop-up optical connectors for easy connection and secure transport, a multi-purpose soft case for all tools and accessories needed in an outside-plant environment
- Secure, rugged data storage on internal memory or on PCMCIA flash cards
- Connections to enterprise IT with USB and LAN ports for data exchange, report generation, and trace storage
- Built-in data processing applications for on-site report generation and PC-based documentation software
- Context-sensitive on-line help, along with on-line and printed training packages to keep training times to a minimum.

Listening to users was critical in making the Modular Test Set a "perfect fit" for technicians' needs. To see how this tester improves efficiency and reduces the cost of fiber characterization, please contact your local Agilent representative for a demonstration.

For more information, visit our Web site at [www.agilent.com/comms/otdr](http://www.agilent.com/comms/otdr) or check 4 on the reply card.



# Protocol testers solve problems in multi-service networks

After several decades of steady evolution toward higher transmission speeds and packet-based technology, communication networks are exhibiting strange and unpredictable behaviors introduced by the deployment of voice over IP, streaming media, wireless data transport, and other new services. Transmission characteristics such as packet jitter and packet delay, which are well-controlled in conventional data networks, have become the source of hard-to-resolve problems. New service-enabling technologies such as MPLS only further increase the likelihood of error.

Networks are feeling the additional impact of the boom in wireless services. Complex new transmission technologies—ranging from variants of 802.11 for LANs to 3G UMTS/CDMA for access networks—are entering the mix, bringing with them new protocols and new categories of problems. Signal strength, interference, handover failures, interoperability, and security are just a few of the issues that must be resolved.

With the inevitable need to bring services online quickly and reduce the spiraling costs of network installation and maintenance, network operators are ready for a new generation of flexible, cost-effective analysis tools.

## Characteristics required of new test tools

New test and analysis tools must be able to handle the range of voice, data, and mobile services carried by today's converged networks. Traditionally instruments have been designed to analyze a specific type of WAN or LAN, but new tools must be able to handle IP traffic streams over any type of network topology.

Because an estimated two thirds of network problems now originate in the OSI layer 3 (network or IP layer) and higher, test tools must be capable of real-time analysis at the higher, network and application layers.



*The Network Analyzer is a powerful protocol analysis tool for advanced, multi-service network testing.*

Many problems at the higher layers can spread quickly through the network and affect large geographic areas. Symptoms can appear at different locations and in different forms; therefore, test tools must be widely distributed and offer expert system analysis in appropriate instrument form factors.

For fast problem resolution, the new generation of tools also requires the ability to analyze large data streams concurrently, synchronize measurements at multiple locations, and correlate results automatically—all in real time.

## A powerful, real-time acquisition and analysis system

Agilent has a new generation of protocol test and analysis tools, the Network Analyzer family, which brings together all the features and capabilities needed to analyze and troubleshoot advanced, multi-service networks. Built around a powerful, high performance data acquisition system, the Network Analyzer gathers data at all access points in the network, at speeds from T1 or E1 up to gigabit Ethernet.

Troubleshooting a multi-service network problem can be like looking for a needle in a haystack. Any packet traversing the network might contain vital clues to a problem's root cause. The Network Analyzer therefore provides full line-rate data capture. It will not miss a packet, even on a completely loaded network.

The Network Analyzer's data acquisition system works with other Network Analyzers to conduct, synchronize, and correlate measurements. These multi-port, time-synchronized measurements, once considered academic exercises, have become essential in assessing the quality of real-time services. In many cases, they also are the only way to identify and isolate the root causes of problems.

The power of the Network Analyzer extends to the higher OSI layers. The new and demanding applications being deployed on top of the physical layer and transport layer routing, bridging, and switching equipment are increasingly the source of network problems. But these problems arise within a structure that embeds TCP frames within IP frames, IP frames within transmission frames, and protocol layer within protocol layer—making analysis exceptionally difficult and requiring considerable processing power. To acquire the application information, the Network Analyzer hardware must process all of these encapsulated protocol layers in real time. This ability sets the Network Analyzer apart from other analysis products on the market, which generally limit testing to the lower layers.

## Capability for the most demanding test scenarios

Multi-service networks are handling an ever greater variety of voice, high-speed data, and wireless services. When different types of services are transmitted over a single network infrastructure, they can affect one another.



For example, in a network that transports data and voice, heavy data traffic can introduce a load peak that conflicts with the demands of voice transport. The sheer number and variety of services and the potential for harmful interaction calls for a tool that can analyze all the services being carried by a converged network.

The Network Analyzer has a broad capability for testing the many aspects and interactions of multi-service networks. Software is available for specific test uses, including IP telephony and 3G UMTS analysis.

Power and breadth in a single test platform make the Network Analyzer a popular tool for many of today's most demanding applications.

- *Gigabit Ethernet*

Gigabit Ethernet is now used in large enterprise network backbones and in the access portion of metro area networks. Although its popularity is rising, this technology is still relatively new and quite demanding. Network equipment and nodes connecting to Gigabit Ethernet structures are under considerable stress. The Network Analyzer is being used widely to test networks and services as Gigabit Ethernet is deployed.

- *IP quality of service*

Most new and many existing applications are based on the IP protocol. Thus to successfully deploy and operate networks and services, the performance of the underlying IP infrastructure must be understood. The Network Analyzer performs IP quality of service testing, which includes measurements of IP packet loss, packet jitter, and delay—the crucial performance indicators in LAN, WAN, and ATM infrastructure.

- *Voice over packet*

Deploying packet-based voice service first requires assessing whether current network infrastructure is capable of carrying voice traffic and, if not, what kinds of upgrades are needed. Once the proper infrastructure is in place, the quality of voice over packet services must be monitored and maintained. The Network Analyzer is used for all these tasks.

- *3G radio access networks*

Third generation wireless technologies make the ideal case for a powerful protocol analyzer. 3G technologies incorporate the most complex set of protocols ever deployed—far more complex than any traditional data application and even more complex than voice over IP. In 3G wireless networks a large number of communication protocols have to work together in an environment where sophisticated data, voice, and multimedia services are delivered with the added requirement of mobility. For 3G service delivery, timing is critical. The Network Analyzer with the 3G UMTS application has been optimized for testing the 3G radio access network at the base station, where all of the signaling and user data is put into the payload of specialized ATM cells, and where the signaling information gets transported. Many things can go wrong, and there is strong demand for the Network Analyzer's ability to test, analyze, and monitor the many inter-working protocols that will transport the new 3G services.

### **Format optimized for any application**

In today's productivity-driven and cost-sensitive business environment, a one-size tester does not fit all. For this reason, the Network Analyzer is available in three form factors that are optimized for different uses.

Some network problems are not too complicated and don't require a dedicated piece of test equipment to solve them. For these cases, a software version of the Network Analyzer can be installed on a PC laptop for quick and easy analysis.

Solving other problems requires carrying the test instrument into the field. The Network Analyzer's compact, portable unit features two acquisition systems for dual port measurements, a built-in PC, keyboard, and display.

Increasingly there is a need to solve complex problems by synchronizing and correlating measurements taken simultaneously at different locations. The problems can then be analyzed and resolved at a central location. An ultra-portable, distributed version of the Network Analyzer can be located at different test points geographically dispersed throughout the network. The distributed units can be connected and controlled from a central PC running the Network Analyzer software.

Regardless of form factor, the Network Analyzers all share the same graphical user interface, so test engineers and technicians need to be trained only once and they will be able to operate any version. With its power, breadth, and flexibility, the Agilent Network Analyzer is the ideal choice for modern, demanding networks.

For more information, visit our Web site at [www.agilent.com/comms/xpi](http://www.agilent.com/comms/xpi) or check 5 on the reply card.

# Remote monitoring: the fast, efficient way to optimize and maintain wireless networks

The build-out of next-generation wireless networks has been slowed not just by the economic downturn but also by the difficulties of implementing new and complex technology. Nevertheless, infrastructure needs are still very real. The number of wireless subscribers worldwide is more than 900 million and growing—and so is subscriber demand for the Internet. To satisfy subscribers and develop new sources of revenue, wireless operators are looking for ways to bypass the economic and technical roadblocks that are impeding the delivery of next-generation services.

Although analysts predict a robust wireless evolution, operators today are being asked to do more with less, both in terms of budget and operations. These constraints have not stopped wireless operators from building new networks or enhancing existing ones, but the squeeze is forcing operators to become more efficient. In some cases, that means giving up long-standing methods of caring for their networks.

The move to 2.5 and 3G wireless technologies adds more equipment and greater complexity to networks, highlighting the need for proactive optimization and maintenance practices. Agilent is helping improve the efficiency and cost-effectiveness of these practices by introducing a new remote monitoring system (RMS). Remote monitoring systems improve the way operators work by allowing them to inspect network trouble spots and diagnose faults from a central location, before having to schedule a drive test or send a repair truck into the

field. Operators can also automate preventive maintenance routines and carry them out remotely.

Agilent's solution consists of two systems, one for remote monitoring of base stations and one for remote monitoring of the air interface. These systems collect data about network performance, detect potential network problems, and simplify troubleshooting. Remote monitoring can eliminate many manual tasks and unnecessary truck dispatches while reducing the likelihood of service disruption. If human intervention is needed to resolve an issue or complete a repair, the RMS can help the wireless operator determine the appropriate level of technician or engineer and the right test equipment for the job. In this way, remote monitoring systems complement the traditional maintenance and optimization test equipment used widely in wireless networks today.

The Base Station and Air Interface Remote Monitoring Systems support multiple technologies including CDMA, cdma2000, GSM, and GPRS networks.

## Monitor base stations remotely

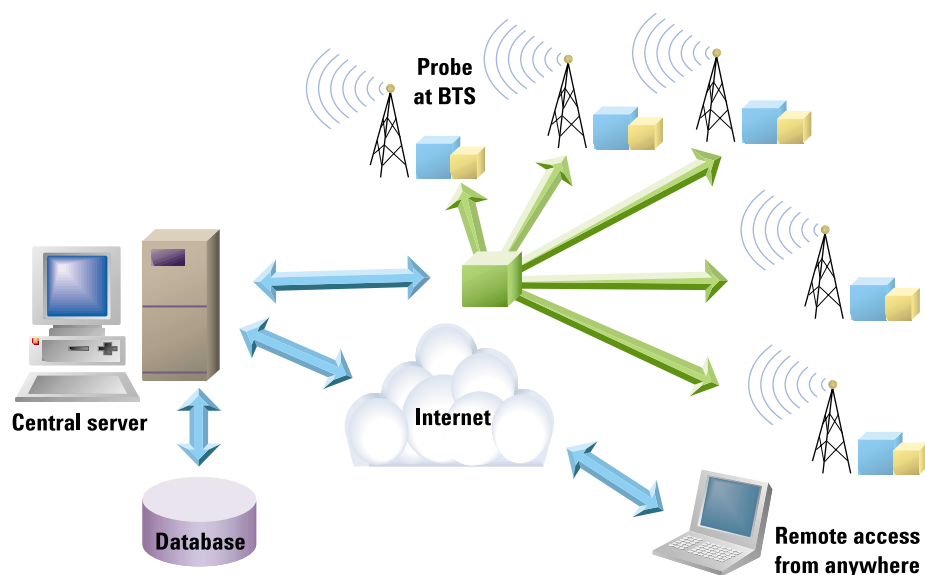
Wireless network operators confront a multitude of challenges: they need to deploy next-generation technologies and services, they need to expand and re-engineer their networks, and they need to maintain or improve service quality—often without increasing personnel costs. Faced with the prospect of spending millions of dollars to maintain equipment at the base stations, operators are aggressively looking for ways to reduce costs without sacrificing quality.

Agilent's Base Station Remote Monitoring System addresses these challenges at the operational level. The Base Station RMS continuously monitors network performance parameters and alerts the network operator if a problem occurs. By placing measurement probes at base stations across the network and using a web browser to observe the status of the network in real time, operators can alert technicians to errors that require action and to trends that may signify future network problems.

With the Base Station RMS, wireless operators can increase the efficiency of their network technicians by as much as 60%, saving millions of dollars in expenses. The system also has the potential to improve an operator's network planning and RF operations. The system's ability to simultaneously monitor parameters such as base station power usage and traffic statistics for any base station in the network, at any time, provides valuable data for a range of operations and business applications.



*Network operators can identify and troubleshoot problems without having to schedule a drive test.*



Agilent Labs, the RMS probes collect information on RF and data-service performance and on network events. This multi-layered view of the network includes geographic and time-related data to help operators locate and resolve RF problems quickly. And by providing a network-wide view of performance as well, the Air Interface RMS offers more comprehensive and accurate trend analysis than is possible with other sources of network data, such as sector-level switch statistics.

*Using probes installed at each cell site, the Base Station RMS monitors the wireless network and provides real-time data.*

Using probes installed at each cell site in a network, the Base Station RMS provides real-time monitoring data on the following:

- Antennas and feed lines
- Base station output power and quality
- Call functionality
- Wireless data tests
- Back-haul links (T-1/E-1)
- Air-interface forward and reverse spectrum analysis
- Other site alarm events.

An Ethernet interface on the probes supports several fast methods of probe-to-server communication. The probes transmit data to a central server that offers a variety of methods of data analysis and trending.

Operators historically have had to schedule preventive maintenance tests to locate problems with base stations. Often in recent years that testing has been performed less frequently because operators don't have enough time or manpower. With the Base Station RMS, operators now can do considerable preventive maintenance testing without ever having to leave the office.

### Monitor the air interface

The process of expanding a wireless network can seem infinite, with problems arising at every step—and often from unknown locations. To ensure that network performance levels are being met, operators have to make numerous drive tests to check air interface performance. The use of remote monitoring tools to collect data on the air interface portion of a network can substantially improve an operator's efficiency.

Agilent's Air Interface Remote Monitoring System is an unattended drive-test solution that consists of remote measuring probes and a centralized database and server, accessible by a web browser. The unmanned probes are distributed remotely throughout the network—typically located inside company vehicles—and can send continuous streams of data back to the central server for analysis. With this system, operators can find answers to their performance questions within hours rather than days or weeks.

The Air Interface RMS can monitor a wireless network 24 hours a day. Incorporating sophisticated communications components developed by

The Air Interface RMS probes collect the following information:

- Call statistics
- Serving cell information
- Neighbor cell information
- Location
- Number of dropped calls
- Number of access failures
- Frame error rate (FER)
- Data throughput
- RF performance
- Layer 3 messaging.

With this solution, wireless operators can make drive testing up to 60% more efficient, reduce time-to-solution cycles by 55%, and introduce a range of effective new monitoring capabilities into their optimization and maintenance practices.

### Satisfying needs in difficult times

The Agilent RMS are changing the way wireless network operators optimize and maintain their networks. These solutions bring wireless network management practices more in line with other technological advances in the industry.

For more information, visit our Web site at [www.agilent.com/find/rms](http://www.agilent.com/find/rms) or check 6 on the reply card.



## Remote monitoring: the fast, efficient way to optimize and maintain wireless networks

The Agilent Remote Monitoring Systems (RMS) for wireless base station and air interface monitoring are changing the way wireless network operators optimize and maintain their networks.

These solutions bring wireless network management practices more in line with other technological advances in the industry. Operators can identify and troubleshoot problems or perform routine maintenance without driving to a base station or scheduling a drive test.

Technicians can gain a better understanding of problems, and when they do have to visit a site or drive the network, they can make better use of on-site test tools and solve problems more quickly. Ultimately, more time and resources will be available to focus on revenue-generating activities and network growth.

► *Read the complete article beginning on page 22.*

### In our next issue:

Wireless technology trends, testing, and service management

Automated inventory and service fulfillment solution

Managing fraud in next-generation networks

Spotlight on Agilent partners