

Services Quality Management Beyond the Network

Improving competitiveness with Services-centric Managed End-to-end Service Operations for a Managed Quality of Experience

Today's connected and technology-savvy end users expect and demand quality services at the lowest price, available where and when they want them, regardless of the network that carries them. To address this continuing demand for quality, network operations will have to evolve to support IP-based service delivery and provide full operations support of those services to meet each customer's quality expectations. As a result, network providers must go beyond network level management and maintenance to service level management that measures success against end user services quality metrics, not just traditional network quality metrics. This new services-centric management challenge can only be properly addressed by a comprehensive, services-centric managed operations solution from a managed services provider.

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It's All About Services

End users don't care about the network. For end users, the network is a given; an intangible that exists somewhere out there and that someone is obviously taking care of. It's the dial tone when they pick up the receiver to make a voice call at home or at the office. It's the service bars at the top right corner of a smartphone. It's the digital HDTV providing outstanding sound and picture quality. And it's the error-free, high-speed line that links them to Internet-based information and entertainment. Somehow, it exists, and end users have come to expect that it will always be there to allow them to connect to all the communications, information, and entertainment applications and services they use in their home or on their wireless device.

For end users, the key question about the network is not "Will I be able to connect?" The key question is "Is my service working the way I expect it to?" This simple reality is the basis of the continuing shift in a network provider's business focus from network management to services management.

As customer demand for advanced applications and services available anywhere, at anytime, and on any device has increased, network providers have discovered that end users — consumer and enterprise — are more interested in the availability, reliability, performance, and quality of the services than they are in the network that carries them. As far as end users are concerned, the network is supposed to be available and reliable, and the basic subscription fee they pay gives them the right to expect it will be so that they can get to the applications and services they really want.

This has been reinforced over the last few years as network providers have realized that the majority of revenue being generated over wireline and wireless networks is not by network subscription fees, but by the new generation of application and services being adopted at an unprecedented rate by end users. And although these advanced applications and services have created an increase in traffic, they are not generating additional revenue for network providers. That revenue is going to the third party application and content providers (ACPs) delivering the services.

To avoid being relegated to the role of providing "dumb pipes" and missing out on the estimated \$100 billion market opportunity¹ for advanced applications, such as mobile and multi-screen video, visual messaging, user-generated TV, and multi-player mobile gaming, some network providers have started to work cooperatively with ACPs. Rather than just focusing on providing network access, they are considering new ways to enhance and support the services being delivered by leveraging network assets to bring additional value to application development and delivery. This is especially true in areas such as personalization, multimedia, quality of service (QoS), and payment.

For example, network providers can provide value for ACPs who want to extend delivery of online video and smart program guides from wireline networks to work seamlessly with a high QoS over wireless networks, and over multiple end user devices and screens, regardless of configuration. By leveraging a network provider's ability to control access, bandwidth, and packet management, this service extension can be a seamless, high-quality experience for end users. In addition, by leveraging a network provider's established and trusted relationship with and knowledge of each subscriber, the same programming can be enhanced with personalized, interactive advertising.

The application enablement opportunities are limited only by each network provider's business objectives. But by examining the possibilities and working with ACPs, network providers can easily establish a key role in the application and service development and delivery value chain. The key to this new approach is a High Leverage Network™ (HLN) that can support IP-based services and a more collaborative working arrangement with third party developers. With a HLN, network providers can speed development and delivery of advanced services, reduce subscriber churn, increase average revenue per user (ARPU), and improve profitability.

¹ Alcatel-Lucent analysis and interpretation of primary market research.

To support application enablement and a HLN, network providers must also rethink their approach to network management. Traditional network management requires ensuring connections are up and traffic flows properly. But this approach does not address end user QoS and quality of experience (QoE) requirements. Delivering advanced applications and services anytime, anywhere, and in the way that end users want them, requires a shift from traditional network-centric monitoring and management to services-centric management. This will put network providers in a position to proactively detect, diagnose and resolve services-related problems before end users know about them. To make this possible, network providers need new systems, procedures, capabilities and skills in the network operations center (NOC).

For many network providers, the additional investments required to make this network monitoring and management transition may not be a cost-effective option. They may want to focus their investment capital on the development of new revenue-generating services rather than on operations infrastructure. Furthermore, the expertise, processes and tools needed for a rapid and efficient transition to a services-centric operations management approach may not be readily available. Likewise, assembling a collection of internally developed services-centric management solutions can distract from application and service development and delivery, and may not completely address end user QoE issues. These and other business drivers may convince some network providers to outsource specific network operations functions to network equipment vendors.

But the new services-centric management challenge can only be properly addressed by a complete, managed, end-to-end, services-based operations solution. A managed solution expands the scope of operations management beyond traditional network boundaries and extends the network operations demarcation point to terminate where the network's IP signal is converted into a TV program, voice call, or Internet access connection — the end user premise or device. In this way, Service Level Agreements (SLAs) are driven by end user service quality metrics, rather than network quality metrics and end user QoE is improved because:

- Performance is measured against service quality targets as perceived by the end user
- Proactive monitoring of end user service quality enables end-to-end proactive operations data analysis
- Service problems can be detected early

Most importantly, this approach empowers network providers to move from concentrating on the successful delivery of IP bits over the network to a more comprehensive, services-oriented operations approach that addresses the needs of ACPs and end users.

Next-generation Network Operations Required

Spurred by a fundamental shift in the way end users conduct their daily work and personal lives, the telecommunications market is going through a significant period of change. Enabled by technologies and end user devices that have severed the cord between them and their home and offices, end users have made mobility an integral part of their lifestyles. In the process, they have become accustomed to the convenience of being able to access information, entertainment, and work at any time and from anywhere. At the same time, they have severed their ties with appointment television and entertainment at home, and are now managing their entertainment options with a mix of online music and video delivered on-demand to their desktops and set-top boxes (STBs) over high-speed connections, as well as notebook and netbook computers linked into wireless networks at home and on the road.

To accommodate this demand, end user communication hardware continues to evolve, with everything from smartphones to video game consoles now capable of connecting, accessing, and interacting over network provider networks. As a result, network providers continue to adjust the configuration of their networks to enable the on-demand, high-speed, and mobile access and delivery of the multimedia content and services end users are demanding. This reconfiguration has necessitated a shift to

IP-based networks and a focus on the availability and reliability of those networks to ensure content gets to where it needs to go, when it needs to get there. And this ongoing change is not expected to end anytime soon.

In a 2009 report, Yankee Group concluded that “the current explosion in connectivity — human and machine, wireless and fixed — is a defining element from which all other features will derive during the next five years”.² The report projected that between 2009 and 2014:

- “Network end points will grow tenfold. Connectivity, like water, is now a human necessity. Thirst for connectivity will power 3.8 billion mobile handsets in 2009 and drive the replacement of 1.2 billion for newer, feature-rich models, according to Yankee Group estimates. This excludes the interplay of Wi-Fi®-enabled MP3 devices like the Apple® iPod touch, netbooks, Amazon’s Kindle and other objects of consumer desire. The Internet of things — goods in transit, connected appliances and machinery — only adds to the kaleidoscope of network end points.
- Network loads will increase 1,000 percent. Communication is endlessly reinventing itself. We’re turning voice into text, audio conferencing into video conferencing and embedding presence and context intelligence into standard business applications. Across the world, more than 12 billion IP video streams are now viewed every month in homes, offices and, increasingly, on the move.
- “Users will dictate application development. Application development is turning on its head. The task now consists of aggregating disparate data sources and delivering them to an interface — often user-defined — that can function irrespective of underlying device or network access method. This is the real frontier of IT and telecommunications convergence.”

This ongoing evolution creates significant challenges for network providers. As enterprise and consumer end user expectations continue to rise end users will expect and demand rapid introduction of more quality, IP-based services to meet their ever-changing lifestyles. They’ll want those services to be of the highest quality and reliability, at the lowest price, and available where and when they want them.

On the business side, evolving the network to deliver and support new services will require significant investment. To enable that investment, end user churn rates will have to be reduced, which will require a greater focus of resources on retaining customers. Likewise, capturing new revenue will require an increased focus on sales and marketing. And managing day-to-day operations to address these requirements will take valuable resources away from strategic initiatives.

Most importantly, to provide advanced services reliably and with high quality, network providers will have to overcome significant technological and operational challenges. Network operations will have to evolve to support IP-based service delivery and provide full operations support of those IP services to meet each customer’s service expectations. This will require network providers to go beyond the network level to monitor performance at the service level, and measure success against end user services quality metrics, not just traditional network quality metrics.

Shifting to Services-centric Managed End-to-end Services

To enable the paradigm shift from managing network performance to managing service quality, network providers must change their operations focus.

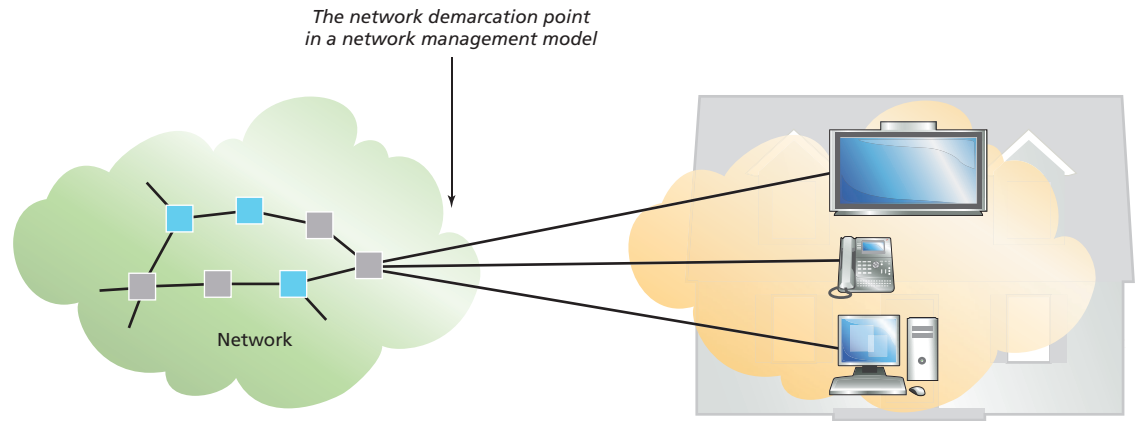
Why is this necessary?

Network operations support and maintenance as it is performed today, by the network operator or managed services provider, focuses primarily on network elements and the transmission of data within the network provider’s domain. It does not extend beyond the network demarcation point

² Finding Value in Services: A Navigational Guide”, Yankee Group, May 2009.

(Figure 1). Monitoring alarms internal to the network is a crucial part of this support and maintenance process. When an alarm is triggered, it is detected at a network operations center where the technicians work to isolate the network fault, detect the problem that caused it, and implement procedures to fix it.

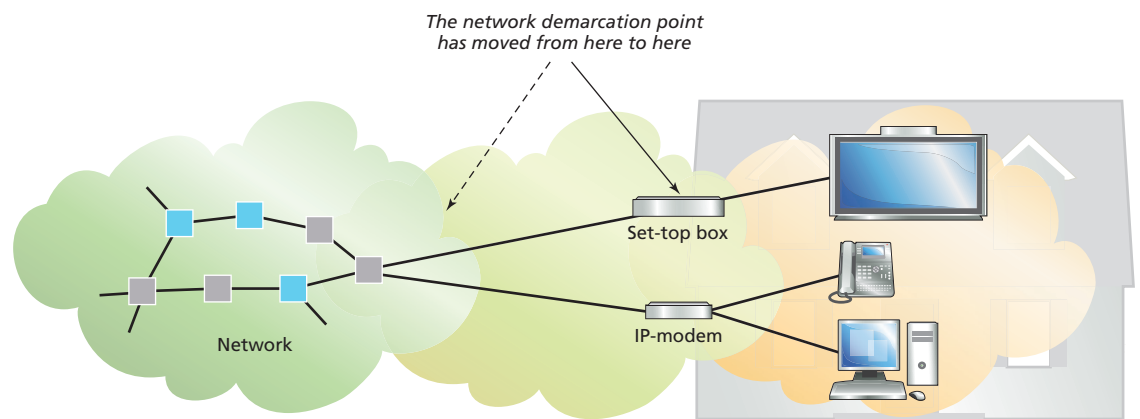
Figure 1. Traditional network operations and maintenance



In this environment, QoS is measured against SLAs designed to ensure the network returns to full operation, and key performance indicators (KPIs) measure network operation through all network elements. What is usually not measured is the end user QoE. So this network-centric operations support is focused on how the network performs and not on how the customer experiences the service the network is delivering.

The problem with this approach in today's IP-based services world is that the network could be exceeding all network performance metrics while the quality of the end users' services could be failing dismally. Therefore, network providers must shift their focus from managing network-based QoS, troubleshooting, and SLA parameters, to managing based on customer services-centric parameters. To do this they must upgrade operations and business support systems (OSS and BSS) and enhance them with new knowledge, capabilities, and skills that will enable them to monitor beyond traditional network boundaries through to the customer premises equipment (CPE) where IP signals are converted into services (Figure 2).

Figure 2. The CPE is the new network termination point for network providers



By extending the monitoring and maintenance capabilities to this new network demarcation point network operations can focus on what the customer experiences, independent of where a problem may have occurred in the network.

For example, for a STB service the network-oriented KPIs could be:

- Availability and downtime
- Blocked traffic
- Facility outage duration
- Transmission failure rate
- Data transmission speeds

But the critical customer KQIs could be:

- User-level service availability (downtime)
- Network availability (downtime)
- Channel change (zap) time
- STB successful power on to default channel
- Rate of disturbance (ROD) impact on customers
- Rate of disturbance duration
- Digital Rights Management (DRM) security breach
- Service/content response time
- Crashes
- Freezing and non-responsive signal
- User interface failures
- Service operations failures

With this approach, SLAs are driven by end user service quality metrics, rather than network quality metrics and end user QoE is improved because:

- Performance is measured against service quality targets as perceived by the end user
- Proactive monitoring of end user service quality enables end-to-end proactive operations data analysis
- Service problems can be detected early

This service-oriented KQI focus is especially critical for the more complex services end users are demanding. Especially when network providers are working with third party ACP partners who want to ensure their applications and services are experienced by end users the way they were intended to be.

Requirements for end-to-end, services-centric management

There are four key requirements for an effective, end-to-end, services-centric management process that supports managed QoE.

First, service availability must be predictable. Obviously, this is not new because effective network operations and maintenance can only be built on predictable network availability. What is new is that availability must now be based on quantitative estimates about network and transactional reliability beyond the traditional network demarcation point. It must include the larger complexity of all the different elements and components in the end-to-end service provision chain, starting with ACPs providing the content or service, to the service delivery platform (SDP) enabling delivery, through the network provider's entire IP-based network, and out to the customer CPE or device.

In short, the whole service delivery chain must be considered when planning, monitoring and maintenance procedures that ensure service availability are developed. Processes must be created and implemented to maintain availability and contingency plans must be ready to address availability issues wherever they may occur in the chain.

Second, to maintain KQI and an improved end user managed QoE, it is important that the risk of outages is minimized. This requires real-time monitoring of services as they travel the entire end-to-end network.

Traditional network-centric management was focused primarily on network elements within the network provider's domain and any root causes of failure due to elements outside of that domain, such as CPE problems, were either undetected or ignored. With services-centric management, this is no longer adequate. Effective, end-to-end service operations requires real-time monitoring of all components involved in delivering the service to ensure that the end user always gets the highest QoE possible — a managed QoE that meets expectations. So if a service-affecting CPE malfunction does occur, operations support must go beyond requiring the customer affected to contact the service provider to find out what happened and initiating a repair. In these situations, operations support must be automated and directly linked to everyone involved in delivering the end-to-end service. In this way, the service provider gets immediate notification of the problem and can initiate a response, which may include notifying the customer about the issue and that it is being addressed, before the customer is even aware of it. This is a challenging objective, but it is critical to ensuring customer satisfaction and, ultimately, reducing customer churn.

The third requirement is an accelerated problem resolution process. This is important because most problems associated with services that will occur in an IP-based network will be immediately recognized by the end user, whether that user is at home, or on the road. By effectively addressing and resolving the problem quickly, customer satisfaction can be maintained.

Finally, the fourth requirement is a services operations infrastructure. To maintain predictable service availability, minimize the risk of outages, and accelerate problem resolution for all IP-based services, network providers must approach services management the same way they approach network management. Network management is built around network operations centers that monitor the health of the network based on key indicators, such as performance, session, fault, topology, and subscriber data. Trouble tickets, a knowledge base, an operator support system, and contact centers that handle customer care are part of the entire network operations process.

Likewise, effective end-to-end services-centric management requires a services operations infrastructure that has the people, tools, knowledge and processes to analyze issues, trends, and faults, and maintain services at required levels at all times. With this infrastructure, network providers can continuously monitor the health of the whole end-to-end service provisioning chain, from ACP to end user.

Partnering for end-to-end, services-centric management

Unfortunately, recognizing the key requirements for end-to-end, services-centric management is only part of the equation. To make the shift to this new approach to service delivery, network providers must invest in the tools, processes and operations infrastructure that will ensure they can deliver and maintain the QoS and QoE end users expect of their advanced IP-based services. For most network providers, this is an additional burden on an already over-taxed operations budget and, as they did with their information technology (IT) systems, some network providers are looking at outsourcing their network and services-centric management operations.

In a 2009 report, Light Reading noted that outsourcing “contracts increasingly encompass end-to-end network operation, and responsibility is creeping into the application and service layers. Previously, contracts encompassed planning, build, and operations; they now include service assurance, as well as network assurance.”³

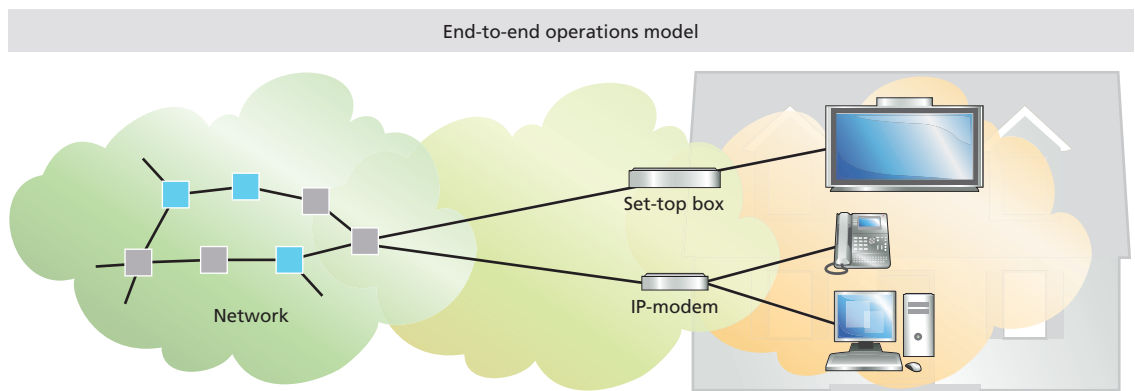
By establishing a strategic relationship with a managed end-to-end service provider, network providers are looking to free themselves of the management burden so they can better address service development and marketing, while their managed service provider partner ensures all services are delivered for an optimal, managed QoE. The ideal managed services partner will have experience with networks and services and an established and proven expertise with the operations and business systems and processes that enable IP-based networks. In addition, that partner will provide vendor-agnostic services to manage and support a network provider’s multi-vendor network and service delivery chain.

Alcatel-Lucent Managed End-to-end Service Operations

Based on its extensive experience with network operations and management, IP networks, and service integration, Alcatel-Lucent has developed an end-to-end, services-centric management solution that addresses the needs of network providers looking for an experienced managed services partner.

The Alcatel-Lucent Managed End-to-end Service Operations solution goes beyond traditional network-centric operations support. It expands the scope of surveillance, monitoring, trouble reporting, and maintenance functions by moving the network demarcation point beyond the traditional network to the CPE (Figure 3). This allows Alcatel-Lucent to extend beyond traditional operations capabilities to cover end user service-based metrics in a fully migrated, IP-based, end-to-end network environment.

Figure 3. Alcatel-Lucent Managed End-to-end Service Operations solution model



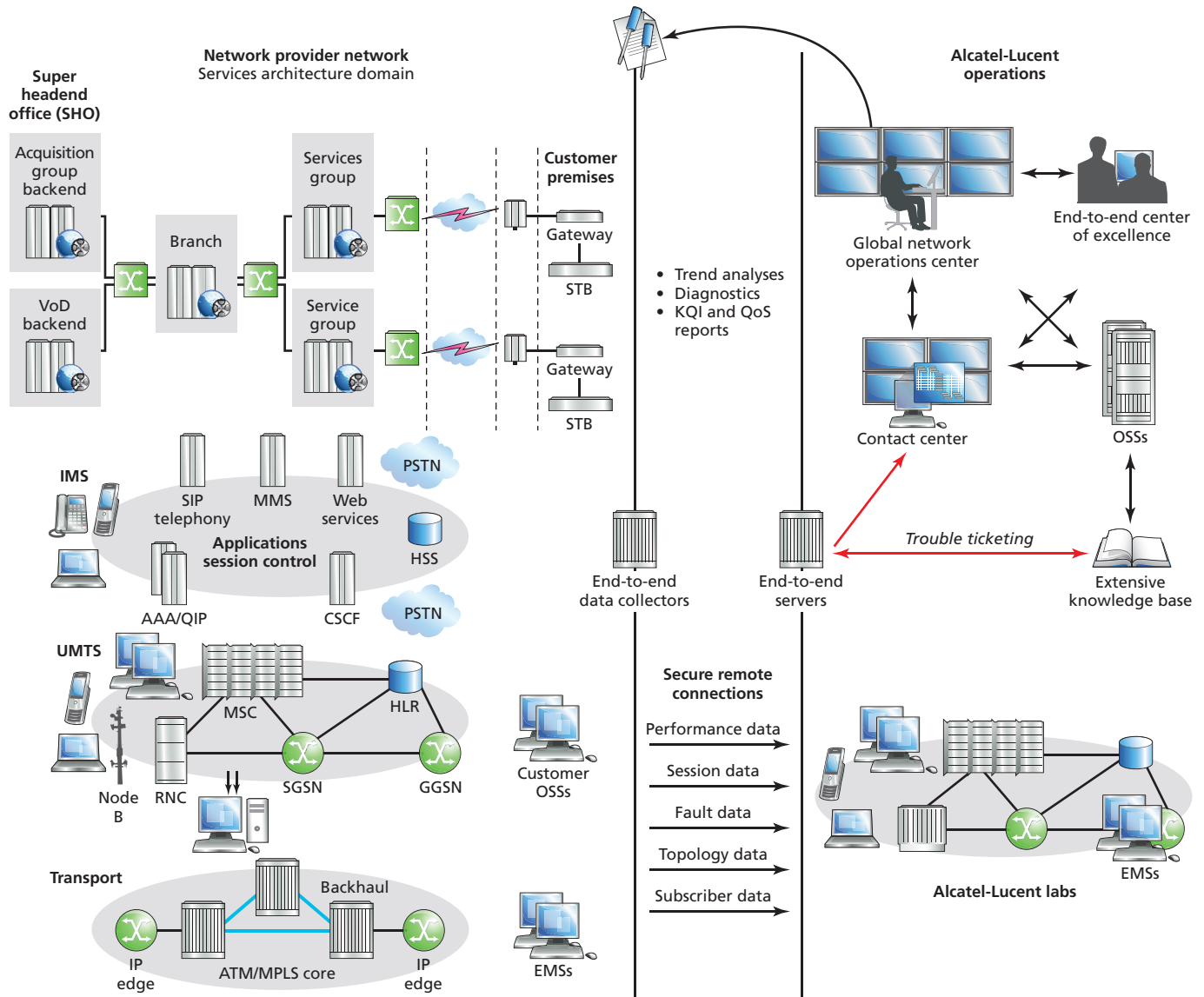
End-to-end, proactive monitoring and analysis

The Alcatel-Lucent Managed End-to-end Service Operations solution includes end-to-end proactive operations data monitoring and analysis tools that make it possible to detect service-related problems early, before end users are aware of them. With this solution, network providers can shift from a traditional network-centric focus to an end user services-centric focus. And they can easily and quickly measure end user service performance against service quality targets.

³ "Telecom Managed Services: The Rise of the Hollow Operator, Light Reading", August 2009.

To make this possible, the solution provides fault diagnosis, testing, and trouble resolution capabilities from 10 advanced, fully staffed Global Network Operations Centers (GNOCs) that currently support over 55 client networks worldwide. These centers are engineered with robust third party network Element Management Systems (EMS), an extensive suite of support tools from Bell Labs, and OSS platforms from leading vendors (Figure 4).

Figure 4. Alcatel-Lucent Managed End-to-end Service Operations solution high-level architectural context



By leveraging these tools and operational processes established through thousands of customer network engagements, the Alcatel-Lucent solution expands service management beyond the core to enable proactive monitoring, management and maintenance of end user service quality. This complete approach minimizes organizational complexity, eliminates internal resource investments, and reduces operating expenditures (OPEX) and capital expenditures (CAPEX). Most importantly, it enables revenue protection and enhancement, and improves customer retention by maximizing each end user's service experience.

Conclusion

As network providers move towards delivering advanced, IP-based services, managing service quality will become the key to future success in an increasingly competitive services-oriented market. But best-in-class service quality management requires a whole new approach that goes beyond traditional network management. In many cases, it may also require additional investment in new knowledge, tools, and skills that will enable network providers to monitor beyond traditional network boundaries and into the new network termination point, the CPE where IP signals are converted into services.

For many network providers, additional investments in network monitoring and management that are required to make this transition are not a cost-effective option, especially when they are striving to strike a balance between capturing new revenue, retaining customers, and managing day-to-day operations. A strategic relationship with a managed end-to-end service provider with these needed capabilities can relieve network providers of the burden of managing service quality. It can help them proactively detect, diagnose and resolve services-related problems so they can maintain their new relationship with ACPs and support the delivery of advanced applications and services anytime, anywhere, and in the way that end users want them.

The ideal managed services partner will have experience with networks and services and an established and proven expertise with the operations and business systems and processes that enable IP-based networks. In addition, that partner will provide vendor-agnostic services to manage and support a network provider's multi-vendor network and service delivery chain.

The Alcatel-Lucent Managed End-to-end Service Operations solution is the result of the extensive experience Alcatel-Lucent has acquired with network operations and management, IP networks, and service integration. It goes beyond traditional network-centric operations support to provide proactive operations data monitoring and analysis tools that make it possible to detect service-related problems early, before end users are aware of them. With this solution, network providers can shift from a traditional network-centric focus to an end user services-centric focus. And they can easily and quickly measure end user service performance against service quality targets.

This complete solution is supported by the Alcatel-Lucent approach to application enablement. Built on a High Leverage Network, application enablement offers network providers a new way to combine their network capabilities with the speed and innovation of the Web to increase revenue and get a higher return on their network, application and service investments. It helps network providers deliver an enhanced end user experience with applications and services when, where, and how consumer and enterprise customers want them.

Acronyms

ACP	application and content provider	KPI	key performance indicators
ARPU	average revenue per user	NOC	network operations center
BOT	build operate transfer	OPEX	operating expenditures
BSS	business support systems	OSS	operations support systems
CAPEX	capital expenditures	QoE	quality of experience
CPE	customer premises equipment	QoS	quality of service
DRM	Digital Rights Management	ROD	rate of disturbance
EMS	Element Management System	SDP	service delivery platform
GNOC	Global Network Operations Centers	SLA	Service Level Agreement
IP	Internet Protocol	STB	set-top box
IT	information technology		

References

List resources for more information about the subject:

- Telecom TV Interview, PART 1: Andreas Herzog, President, Managed Services Division, Services Business Group – Sept 2009
- Telecom TV Interview, PART 2: Andreas Herzog, President, Managed Services Division, Services Business Group – Sept 2009
- Telecom TV interview with John Ramirez, VP of Managed Services – Nov 2009
- Camille Mendler, Yankee Group and Andreas Herzog discuss managed services – Nov 2009

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