

The New Global Village



Maximizing QoE with Intelligent and Integrated Network and Applications Performance Monitoring



Introducing Brian Gottbetter



Current Role at Global Crossing

- Global Director of IP Product Management
- Responsible for the IP network capabilities that support the company's IP convergence strategy

Prior Role

- General Manager of AT&T Solutions' Operations
 - Operations
 - P&L
 - Sales
 - Marketing
 - Consulting

Education

- Bachelor of Arts degree in Economics from Stonybrook University
- MBA in Information Systems from the Lubin School of Business
- Pennsylvania State University's Executive Program in Operations Management



Overview

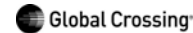


Maximizing QoE with Intelligent & Integrated Network & Applications Performance Monitoring

- Quality of Experience (QoE)
- Market Landscape
- How Global Crossing is maximizing QoE today
- How Global Crossing may maximize QoE in the future



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Defining Quality of Experience (QoE)



Any definition would be somewhat subjective but focus on the end user:

- What is the quality of the end user's experience?
 - End user's *perception* of his/her experience is more important than *actual* network/applications performance
- What is the end user's perception of network/applications performance?
 - Greatly influenced by other experiences and expectations
 - Remember upgrading from dial-up Internet Service to high-speed option?!
 - Nearly all end users are conditioned to expect continuous QoE improvements based on ever-increasing network/applications performance
- How challenging it is to configure/personalize an optimal applications mix?
- How is QoE being impacted as more and more latency-intolerant applications compete for network bandwidth?
 - VoIP
 - Video
 - Collaboration
- Do end users have different expectations in the consumer versus the enterprise space?

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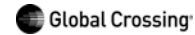


Factors Influencing QoE



- Technology continues to emerge and evolve at an ever more rapid pace
- VoIP and Video are invading our lives—both personal and professional
- Fixed-Mobile Convergence (FMC) is beginning to impact Virtual Private Networks (VPNs)
- Convergence drives complexity behind the scenes but...
- End users and all those who support them need simple interfaces to manage increasingly complex infrastructure
- Consequently, it is essential to embed more intelligence in solutions
- Latency-intolerant applications are driving the need for intuitive monitoring and reporting—literally second-by-second
- Hardware and software once categorized as “value-added” options are now integral network components for effective and efficient management
- Service providers must have efficient network and applications performance management capabilities to achieve QoE, as defined by the perceptions of solutions’ end users

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Market Landscape

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Trends Impacting QoE

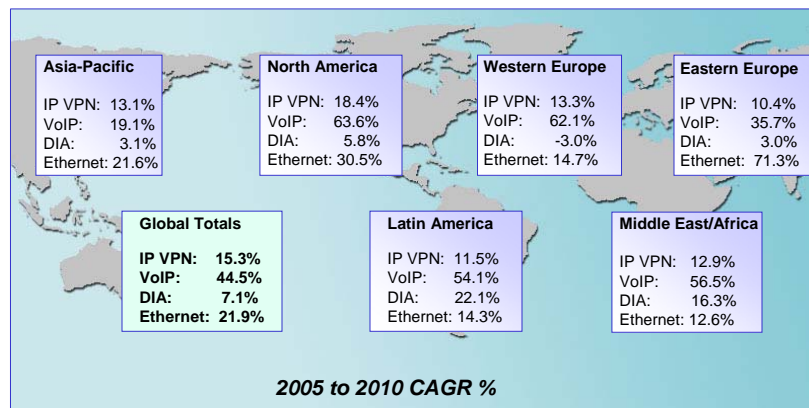


Trend	Impact on QoE
<i>Data</i> is growing faster than voice and will be the majority of spend	As Convergence grows, so does the need for applications/performance management
<i>Wireless</i> is growing faster than wireline and will be the majority of spend	Providing a seamless FMC experience will be critical
<i>Security</i> continues to be a growing requirement as mission critical apps are centralized	Security must protect end users' experiences without negatively impacting them
<i>Network Based Strategies</i> are being adopted to enable companies' business models	As we do more and more online, both professionally and personally, QoE becomes part of our Quality of Life
<i>Collaboration</i> services are being broadly adopted as key work group applications.	End users will not tolerate latency in VoIP & Video

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Enterprise QoE Challenged by Global Growth in IP, especially VoIP



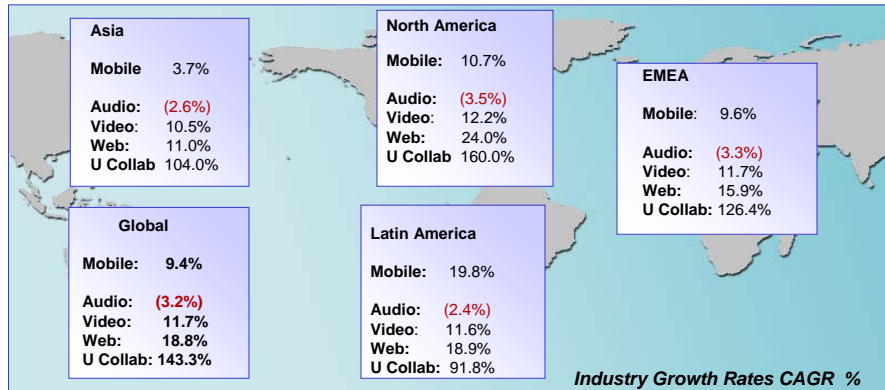
Source: Gartner/Dataquest Fixed Public Network Services Report, August 2006

- Double-digit growth in IP services continues worldwide
- Accelerated growth for Enterprise VoIP services
- Ethernet demand growing in all regions

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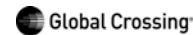
Enterprise QoE Challenged by Mobility & Unified Collaboration



Source: Mobile/Wireless CAGR 2003 to 2010 from Yankee Group Top Line Forecast Data, Published February, 2007
Collaboration from Ovum 2005 to 2010. Published March 2006

- A November, 2006 report by The Radicati Group said the growth for Unified Communications will grow to \$19.7 billion by 2010, up from \$2.6 billion in 2006, a four year CAGR of 65.9%

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QoE Challenged by Mobility & FMC

End User Expectations

- Ubiquitous, secure remote access to the same applications as office-based counterparts to maintain/enhance productivity and to support a manageable work/life balance
- Intuitive experience regardless of location or access type
- Seamless hand-offs between wireless and wireline devices

Enterprise Expectations

- Centralized billing and call records
- Accurate reporting on actual mobile access spending
- Endpoint policy management to uniformly enforce corporate security policies

Global Crossing Point of View

- FMC capabilities are being embedded as part of our IP VPN service, rather than creating a stand-alone offer

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QoE Pain Points for Enterprises



- Do the administrators of your network and your applications point fingers at each other when network/applications performance issues arise?
- Do your end users complain about intermittent network or applications performance issues?
 - "Why was the quality of my video conference so poor yesterday afternoon?"
 - "I could only hear every other word on my last phone call."
 - "The backup ran so slowly that it couldn't be completed before we needed the system again this morning"
- Are you able to monitor performance real-time from Layer 1 (Physical Layer) up through Layer 7 (VoIP, Video, Oracle, SAP, etc.) in one-second increments?
- Are you concerned about migrating to VoIP?



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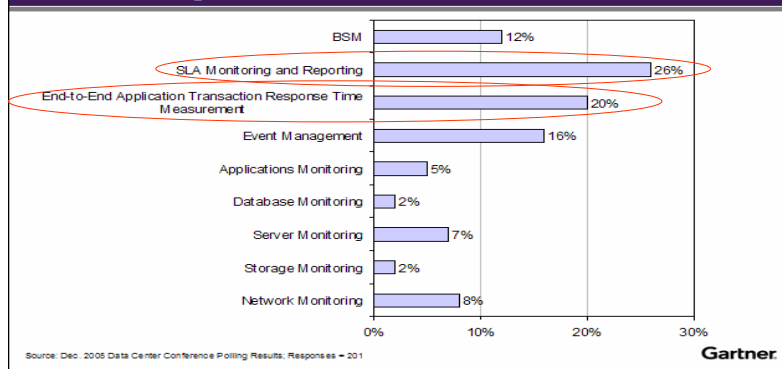
Future-Net
MANAGING THE FUTURE

Global Crossing

Demand for Tools to Manage QoE



Top Priority Availability and Performance Monitoring Tool Investment in 2006



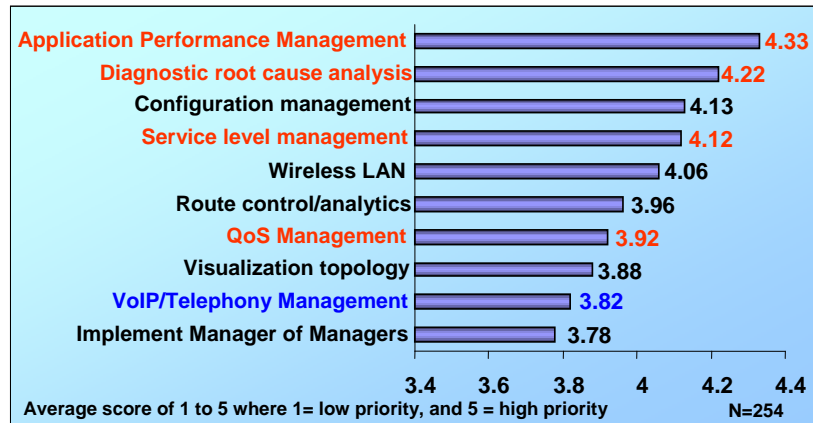
Polling results show that investment in service-level agreement (SLA) monitoring and reporting and end-to-end application transaction response time measurement are high priorities to CIOs and IT managers.

Future-Net
MANAGING THE FUTURE

Applications Performance Management Critical to QoE

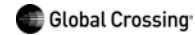


How great a priority are each of the following new network management tools?



Source: Yankee Group 2005 Network Management Summary

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How Global Crossing is optimizing QoE today

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Global Crossing Maximizes QoE Today



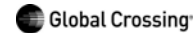
Global Crossing Applications Performance Management® (APM)

- Offered in partnership with industry leader, Fluke Networks
 - Visual UpTime Select launched in 1993
 - Visual Networks acquired by Fluke Networks in 2006



- Through our strategic relationship, Global Crossing customers can have:
 - "Best-of-breed" APM available from the industry
 - Other Managed Solutions from Global Crossing
 - Single point of contact, customer care, billing and accountability

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GC's Bundles of Fluke Networks' Software Modules



Global Crossing Applications Performance Management (APM)

Network Integrity (NI)

- **Select Service Summary** (network health and events)
- Plus SLA Reports
- Includes 3-day replacement of hardware warranty

Network Integrity
is a standard
element of
Global Crossing
IP VPN service

Applications Integrity (AI)

- Includes all elements of Network Integrity and adds...
- **Select Class-of-Service**
- **Select AppFlows**
- **Select AppSummary**
- **Select Network Troubleshooting**
- **Select Back-in-Time**
- Optional upgrade to NI

VoIP Integrity (VI)

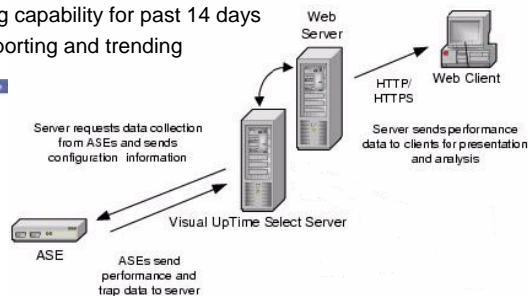
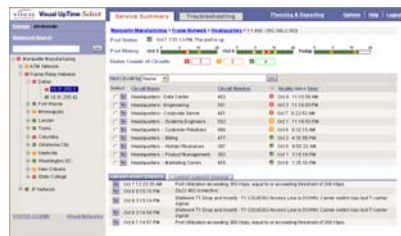
- Includes all elements of Applications Integrity and adds...
- **Select VoIP**
- Optional upgrade to AI

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How Does Network Integrity Work?

- Standard element of GC IP VPN Service
- Analysis Service Elements ("probes") are installed on WAN side of customers' routers
- Relay data to centralized server
- Intuitive color-coded interface is accessed via uCommand
- Data is captured in one-second increments
 - NOC has detailed troubleshooting capability for past 14 days
 - NOC has one year of data for reporting and trending



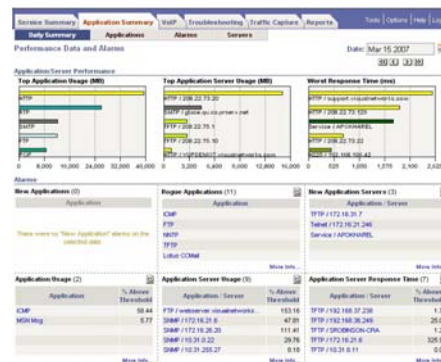
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Future-Net
MAKING NETWORKS WORK BETTER

Global Crossing

Applications Integrity (AI) Service

- Unique view of monitoring application performance from a network perspective
- Extends real-time performance monitoring and reporting capabilities of Network Integrity up the OSI model to Layer 7 applications
 - VoIP, Video, CRM, ERP
- Capturing application-specific performance data is crucial for measuring compliance with Service Level Agreements in support of VoIP, video and other services with critical Class of Service (CoS) requirements
- Can better plan for changes in network design or the mix of applications supported
- Can conduct per-site pre-assessment analyses of network/applications changes prior to implementation via Global Crossing Professional Services



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MAKING NETWORKS WORK BETTER

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VoIP Integrity (VI) Service

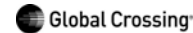


- Provides key performance reporting and indicators for VoIP
 - Per-call Mean Opinion Score (MOS) metrics
 - Measure the quality of VoIP as it is perceived by the human ear

Mean Opinion Score (MOS)		
MOS	Quality	Impairment
5	Excellent	Imperceptible
4	Good	Perceptible but not annoying
3	Fair	Slightly annoying
2	Poor	Annoying
1	Bad	Very annoying

- Global Crossing was the first partner of Visual Networks (now a part of Fluke Networks) to commercialize the Select VoIP addition to their award-winning Visual Uptime Select software suite
- VoIP Integrity is a natural complement to Global Crossing's Enterprise VoIP Services
- Can conduct per-site VoIP pre-assessment analyses prior to implementation via Global Crossing Professional Services

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How APM Positively Impacts QoE



End Users' QoE

- Administrators can identify and resolve network/applications performance issues before end users perceive them and generate trouble tickets
- Proactive visibility into the root causes of performance issues eliminates the need for 25% of all trouble tickets, based on historical averages

Enterprise QoE

- One-second granularity in Layer 1-7 network and application key performance indicators both real-time and historically
 - GUI is intuitive and interactive
- Proactive Alerting
 - Administrators are freed from actively monitoring the GUI
- Reduces organizational conflict and finger-pointing
- Sharing the same graphical interface between enterprise's staff and our NOC promotes the efficient resolution of trouble tickets

How can APM capabilities positively impact your QoE and bottom line?

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Positive Market Response to APM



In response to one of our APM-based Network Professional Services—a Wide Area Network (WAN) Assessment—delivered with a leading collaboration solutions provider, vc-net:



"In my opinion it was one of the best presentations I have ever attended. The quality of the information and the attention to detail in the analysis was superb. I would also like to say that the content of the analysis went far beyond our expectations; you obviously understood better than us what our requirements were and then pushed "the extra mile" to produce really useful information for us. Our projects (eMail, backup, WAN, Agresso, Promotor and voice) will all really benefit from the quality and quantity of your hard work. Once again, many thanks for all your efforts."

—Roger Nichol, Head of Infrastructure, Archant

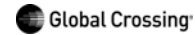
In response to the addition of Network Integrity to IP VPN service:



"Global Crossing's innovation in performance management integrated into its industry-leading IP VPN service addresses an increasingly critical need for enterprises around enhanced network visibility, control and business continuity solutions. The introduction of industry-leading end-to-end SLAs with Global Crossing IP VPN Service guarantees network performance more comprehensively."

—Courtney Munroe, vice president at IDC for business services

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How Global Crossing may maximize QoE in the future

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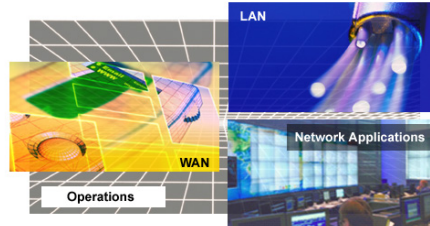
Today — Communications Solutions Integrator



Converged IP Enhancements: A fully managed end-to-end IP applications service environment where data, voice, video and multimedia applications are supported on a single IP-based platform. Real-time network & applications performance visibility, reporting and SLAs, via uCommand portal, providing enterprises more network control.

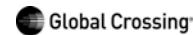
Managed & Professional Services:

Delivering Managed Network, VoIP, and Security services to a Converged IP solution. Professional services for full life cycle end-to-end assessment, design, implementation & management.



One Connection, Any Service

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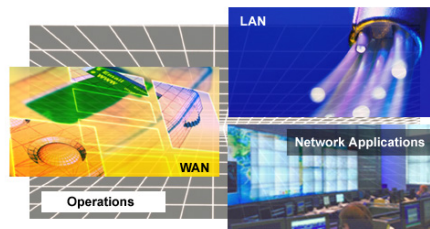


Tomorrow — Communications Solution Provider *Mobility & Presence-Based Applications*



Converged IP Network Intelligence: Enhanced presence-based IP applications and network intelligence added to the Converged IP environment enhancing the data, voice, video and multimedia applications on a single IP-based platform.

Mobility Solutions: Seamless integration between fixed and mobile communication services, across any access medium. End-user management of voice, collaboration, email and messaging defined by presence and personal preferences.



One Connection, Any Service

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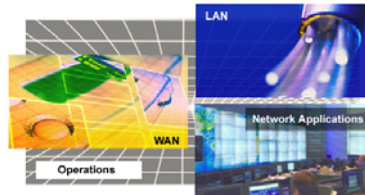


Future — Premier Communications Partner



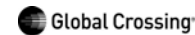
Premier Communications Partner: Expanding the service portfolio to deliver flexible options for the outsourcing of telecommunications and related IT functions for an end-to-end solution. Capabilities to include Data Centers, Web Hosting, Storage Area Networks, Handset/Device Management, LAN management, and other capabilities as required by our enterprise customers.

Session Aware Applications: Taking Network Intelligence to the next level — providing session awareness with automated policy management for dynamic bandwidth allocations across the LAN/WAN to meet enterprise customized performance requirements.

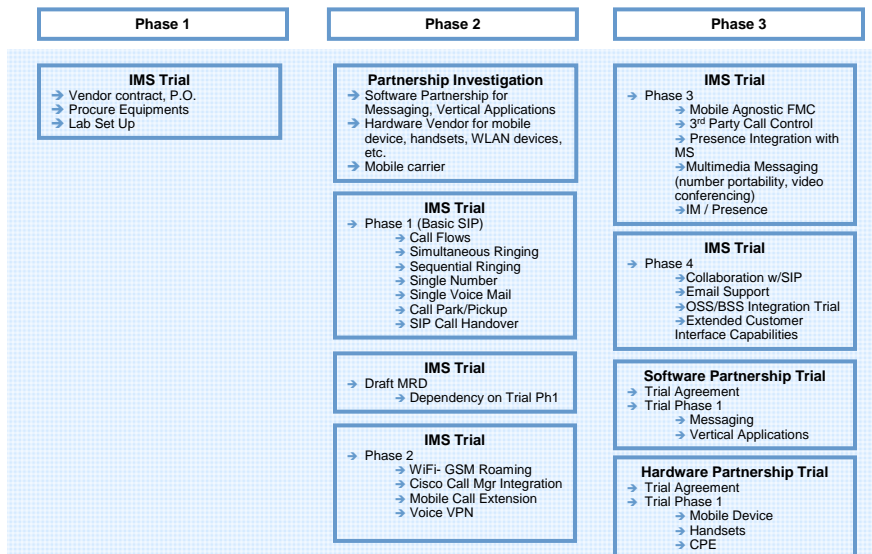


One Connection, Any Service

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IMS/FMC Trial Roadmap



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FMC Trial Objectives



Feature Definition

- What are end users' QoE requirements?
- What are enterprises' QoE requirements?



Cost Definition

- What are the costs of meeting the defined QoE requirements?
- Are there new applications performance management requirements?

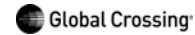


Marketing Opportunity Definition

- What is the value of the feature set to end users?
- What is the value of the feature set to enterprises?
- What is the value of the relationship to partners?



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For More Information



▪ GlobalCrossing.com

- Solutions
- Enterprise
 - Applications Performance Management

▪ VisualNetworks.com (now part of Fluke Networks)

- Partners
 - Service Providers
 - Global Crossing

Brian Gottbetter

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Global Crossing

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