Ensuring IP Telephony Performance Through Remote Monitoring

Introduction

The advantages of IP Telephony are well-known, among them network consolidation, centralized voice administration, long-distance toll savings and unified applications. If your company is one of the growing number of IP Telephony adopters, it is also important to consider the day-to-day challenges for maintaining the service level and performance of this business-critical technology. Since converged networks are subject to Quality of Service issues, IP Telephony systems require some means of ensuring that voice calls are guaranteed <u>priority</u> and reflect the <u>high quality</u> that users took for granted with traditional voice networks. An effective way to achieve these goals is through the monitoring of IP Telephony components and end-to-end service quality.
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Four major benefits that IP Telephony Monitoring provides are:

- Maximizes *VoIP performance and availability* with 24x7 proactive monitoring of the QoS performance and call quality delivered in the network.

- *Identifies operational problems* by helping quickly determine if performance problems are caused at the hardware, operating system or application level before users detect them

- *Automatic Event Reporting* by sending critical information to the right people via alert notification.

- *Technical expertise* that companies may not be able to afford in-house

VoIP Availability and Performance

VoIP users expect nothing less than voice services that are "toll-quality" and "always-on" – in other words, just like what they had before their voice and data networks converged. They don't care that converged network traffic opens the door to jitter, delay, packet loss, echo or a host of other Quality of Service and voice quality issues; they just want to be able to make and receive calls without worries. To meet these unflinching user expectations, it becomes incumbent upon organizations to ensure VoIP call quality and availability before users can be affected by these call performance and quality issues. An IP Telephony monitoring system detects both types of issues before they have a chance to affect users throughout a network.

The availability of IP Telephony services depends on the availability of its supporting network infrastructure. This includes the diverse hardware platforms and operating systems (OS), databases, e-mail platforms and IP Telephony-specific applications like Automatic Call Distribution (ACD) or Interactive Voice Response (IVR) systems. If any of these components malfunction in any way, they will undoubtedly exacerbate the operating conditions and performance of critical IP telephony services such as IP phone availability, TFTP response time, registered devices, call activity, call failures, music on hold and gateway/gatekeeper response time and utilization. All relevant devices and services must be carefully monitored on a 24x7x365 basis for possible failure or malfunctions.

Additionally, the ability to provide critical call routing performance metrics through monitoring allows organizations to effectively plan and size the resources needed to provide uninterruptable services 24x7x365.

Critical to ensuring VoIP call quality is the monitoring of the QoS network performance. The key QoS metrics related to VoIP/IP telephony are **delay**, **jitter** and **packet loss**. Various factors can cause a VoIP call to be delayed: the time a codec takes to convert voice to data, the time a packet experiences crossings an interface in a switch, encryption, filtering and more. Jitter refers to the gap <u>between</u> consecutive delay packets arriving at the destination; a packet might be delayed but the second isn't, resulting in a choppy voice quality. Finally, voice packets can be dropped if part of a network presents excessive congestion.

In a full-time monitoring structure, QoS measurements can be set up such that if they approach predetermined threshold levels, an alert will be sent to a designated engineer to respond for immediate correction. Without monitoring controls in place, VoIP callers would be more likely to experience delay, jitter and/or packet loss, hear their voices echoing, "step" on each other's sentences (overlap) or worse -- not be able to converse at all.

Monitoring Components

An IP Telephony monitoring program requires two key components in order to be highly effective:

- **24x7x365 monitoring and response.** Few companies can afford to devote their IT resources full-time to this kind of effort; most are already overburdened with existing support responsibilities. So unless a company is fully prepared to staff a Network Operations Center 24x7x365 with a team of qualified network experts, it's probably best to outsource IP Telephony Monitoring to service providers who can do it full time.

- **A highly sensitive and comprehensive monitoring system.** Network monitoring tools come in all shapes and sizes, but some sacrifice sensitivity or frequency of detection for lower prices. Network monitoring service providers such as NEC Unified Solutions employ advanced tool sets recognized for their comprehensive, sensitive monitoring capabilities.

The decision to outsource monitoring to a 3rd-party service provider has other financial advantages. Licensing fees for monitoring applications can be cost prohibitive if a company were to purchase these in-house, but a service provider absorbs these costs. Outsourcing monitoring also means that customers do not have to worry about keeping up with the latest OS or software patches, tasks that can add to already burdened IT schedules.

NEC Remote Monitoring for IP Telephony

To help companies manage their converged networks, NEC Unified Solutions offers Remote Monitoring for IP Telephony, which provides 24x7x365 remote monitoring and reporting of NEC and Cisco hardware, server-based applications, operating systems and voice gateways as they relate to IP Telephony.

NEC Remote Monitoring for IP Telephony leverages a fully staffed Network Operations Center and industry-leading tools from NetIQ and System Management Arts (SMARTS) to monitor IP Telephony infrastructure and the data network including routers, switches, and servers - whether they are in a single location or distributed across the country.

The monitoring service provides:

- **24x7x365 Monitoring** - Ensures high availability with 24x7 proactive monitoring of the health and performance of the network, servers and application software reducing the time spent diagnosing and resolving voice problems. NEC Unified Solutions' system resolves potential performance issues with event-driven actions before users can be affected.

- **Call Performance Monitoring** - ensures call quality, availability and critical QoS performance metrics including jitter, delay, lost data, codecs, silence suppression and jitter buffers. NEC Secure helps reduce the time spent diagnosing and resolving IP telephony availability and voice quality issues. Ongoing metrics are captured for trending call quality over time based on G.107 and mean opinion scores (MOS) to resolve potential performance issues before users are affected.

- **Fault isolation and escalation** - Device monitoring conducted by the NEC Unified Solutions Network Operations Center (NOC) provides for root cause analysis and identifications of device and equipment impairments. Identified impairments will be escalated to NEC Unified Solutions Technical Assistance Center (TAC) for resolution for devices protected by NECSecure maintenance. Identified impairments for devices not covered under maintenance will be escalated to customer designee for resolution.

- **Performance/Engineering Analysis** - Quality of Service is assured through ongoing measurement of voice quality on each segment of your network. NEC Unified Solutions' certified engineers provide network recommendations based on analysis of utilization, trending, and error exception reports. These recommendations focus on improving availability and the performance of IP Telephony and associated applications.

- **Configuration Backup** – NEC tracks and stores configuration information about monitored CLI-based devices daily.

- **Managed Component Reporting** – NEC Unified Solutions delivers key reports about the customer's IP Telephony environment to the customer's desktop over the web or through e-mail. Extensive reports allow for monitoring service levels, call quality, overall performance, usage trends and capacity planning. Managed components include:

- Server-based IP Telephony services from NEC, Cisco, and Interactive Intelligence: HP Proliant, Cisco MCS, Dell and NEC Server class hardware, Microsoft 2000 Operating System and applications such as SQL, Exchange, and IIS.

- Management of IP Telephony devices: IP phones, call center agents such as Cisco IPCC Agents, Unified Messaging ports, SNMP Layer 2 and Layer 3 devices.

The following diagram illustrates the connectivity between a customer's monitored IP Telephony components and the NEC Unified Solutions Network Operations Center (NOC):
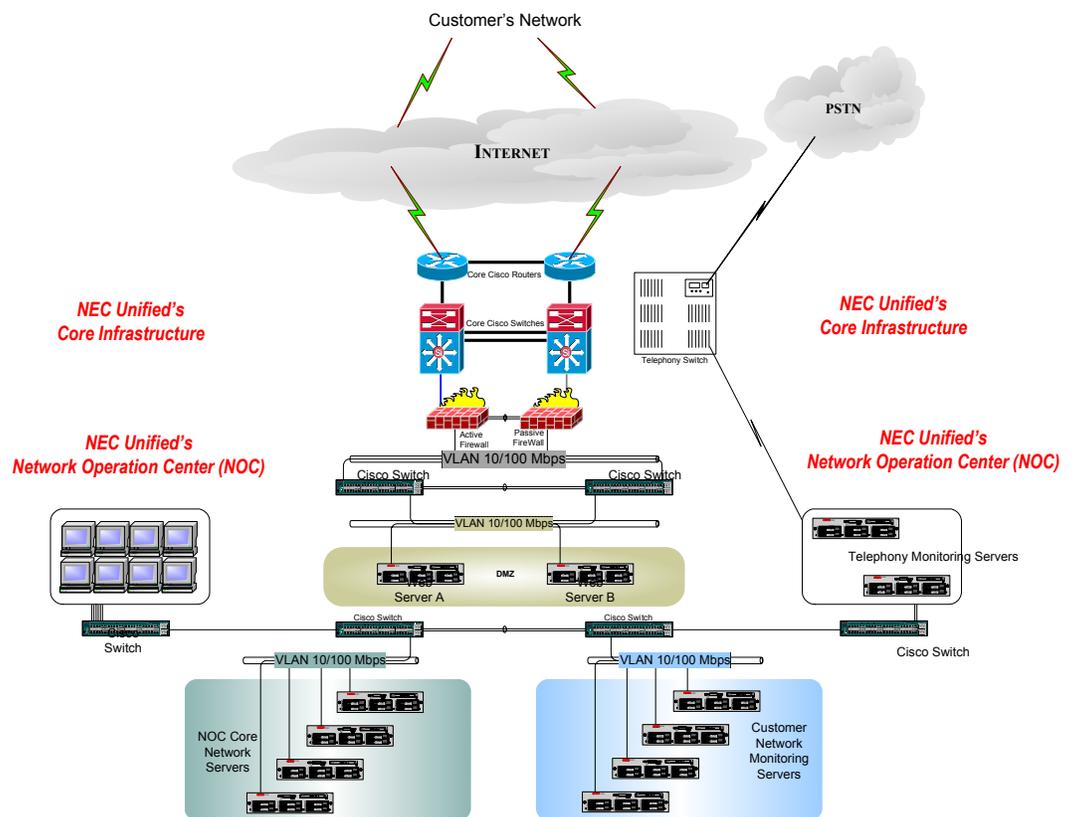

Fig. 1 Customer connectivity to NEC Unified Solutions NOC

Each customer network is connected to the NEC Unified Solutions NOC through a secure VPN connection, limiting SNMP and ICMP traffic. Remote management, also available through NEC, and remediation of monitored devices is provided for on alternative VPN connections.

NEC's Remote Management Services allow companies to either share management of their IP Telephony infrastructure or out-task these responsibilities completely, depending on their business needs. These services include:

- **Essential Remote Management Service** – provides Remote Monitoring, incident management and configuration backups for IP Telephony platforms, servers, network devices and applications. This option allows customers to retain control over configuration management and optimization.

- **Comprehensive Remote Management Service** – in addition to the Essential Remote Management Service, provides configuration management, ongoing trend analysis and optimization and a dedicated customer service manager. This option provides the customer with a fully managed arrangement.

Why NEC Unified Solutions?

With a rich telecommunications heritage of over a century, NEC Unified Solutions is well-versed in a total solution approach to implementing and managing IP Telephony. Our state of the art Network Operations Center in Irving, TX, is integrated with best-of-breed monitoring and notification systems and staffed 24x7x365 by certified network engineers whose sole responsibility is to monitor, report on and make recommendations regarding customer networks. Unique customizations enable NEC to achieve better-than-industry mean times to notification and repair, and our technical support is consistently rated as outstanding by our customers.
If your organization would like to ensure VoIP quality and availability, as well as reduce the time spent diagnosing and resolving IP Telephony quality issues, visit NEC Unified Solutions' Web site at http://necunified.com.

About NEC Unified Solutions

NEC Unified Solutions Inc., a leader in integrated communications solutions for the enterprise, delivers the industry's most innovative suite of products, applications and services that help customers achieve their business goals. With more than a century of communications and networking expertise, NEC Unified Solutions, Inc., a subsidiary of NEC America and affiliate of NEC Corporation (NASDAQ: NIPNY), offers the broadest range of communications services and solution choices, flexible product platforms and applications, and an open migration path to protect investments. NEC Unified Solutions, Inc. serves the Fortune 1000 and customers across the

globe in vertical markets such as hospitality, education, government and healthcare. For more information, visit www.necunifiedsolutions.com.

Document Information

This document is intended to provide outline information only and can change without prior notice.

Additional Resources

"Ensuring QoS Through Proactive IPT Network Management," NetSolve white paper.

"Laying the Groundwork for IP Telephony," NEC Unified Solutions white paper.

"PVQM – Proactive Voice Quality Monitoring," Nortel Networks.

Trying to measure VoIP call quality," *Network World* (3/18/03).

"Voice and Fax over IP Protocol," Texas Instruments, http://www.iec.org/online.