Cable Telephony Quality of Service
An Approach to Real-Time Service Assurance

White Paper
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Overview

Cable Telephony Quality of Service

Any technology that wishes to challenge traditional incumbent phone services that have evolved for over a century must start from the perspective of enhancing the calling experience - voice quality, echo, silence/noise, post-dial delay, etc. In the Net2Phone cable telephony solution, two critical Quality of Service (QoS) aspects exist that meet this challenge.

The first aspect of QoS is inherent in a managed Cable Telephony service, which is integrated into an Operator's High Speed Data (HSD) deployment, and utilizes the suite of standards forged by CableLabs, such as DOCSIS and PacketCable. With voice-carrying packets given priority in the network, and the full connection from telephone through MTA/Cable Modem to CMTS to soft switch being run on a managed IP network, you as an Operator have a compelling advantage over alternative consumer-targeted voice services forced to bypass the Operator's infrastructure and control.

The second key aspect of QoS is Net2Phone's Real-Time Service Assurance technology, a system developed and implemented by Net2Phone. Real-Time Service Assurance provides a view of all calls as they are occurring while drilling down to examine every call on every device at any time. In addition, the system proactively monitors and analyzes the VoIP service and the underlying HSD cable plant, alerting Network Operations Center (NOC) staff to anomalies and anticipating potential call quality problems often before a customer is even affected. Built-in data mining enables the setting of thresholds across a vast number of metrics, resulting in summary reports targeted to senior executives as well as detailed reports targeted to a spectrum of members of an operations staff.

Net2Phone's NOC, running 24 x 7, 365 days a year, toils behind the scenes to carefully monitor the solution deployed in the operator's network, augmenting your own staff with an experienced team of VoIP professionals. Thus you can get up and running with a toll quality telephony service without the need to hire and train a completely new staff. With Real-Time Service Assurance, you get the benefit of a world-class set of tools to track the quality of the underlying HSD service in the cable plant as well.

Net2Phone's Cable Telephony Solution has been designed from the ground up to deliver superior Quality of Service, on a platform that is highly scaleable, with redundancy built-in at key points of failure. Backed by the experts at Net2Phone's NOC, you can have no better partner in delivering voice services to cable subscribers.

VoIP’s Unique Opportunities – and Challenges

The clear economic and operational advantages of Voice over Internet Protocol (VoIP) – lower total cost of ownership, easier bandwidth management, reduction in infrastructure and workforce costs as well as a bridge to future technology – have made it inevitable that this new technology will supersede the old. As carriers limit incremental investment in circuit switched-based technologies, it becomes a question of who can offer VoIP services first, and who can offer them best. Today's carriers recognize that the real upside to VoIP is not the traditional arbitrage, but rather the ability to quickly deploy revenue-generating enhanced services – multimedia conferencing, desktop data collaboration and others – that can often double per-minute revenue.

However, along with the advantages of VoIP come formidable performance and fault management challenges. As a “real-time” packet application, voice presents unique difficulties in problem identification and resolution. IP lacks the predictability associated with circuit-switched networks, and without strong network monitoring and management capabilities, service quality can suffer. Packet-centric network management solutions may provide retrospective metrics such as dropped or delayed packets, but they do not give operations staff meaningful telecom network quality measures – voice quality, call setup times,
blocked calls and so on. Only the highest degree of visibility and control at the call level can support world-class voice and enhanced services over IP.

**Introducing Net2Phone's CVOSS**

The Cable Voice OSS Solution (CVOSS) is the central component of Real-Time Service Assurance. It was designed to eliminate the “black box” aspects of providing Voice over IP services. CVOSS collects real-time call information from the Cable access network, Record Keeping Server and VoIP gateways, complements it with a broad range of independent PSTN tests, and adds extensive data correlation, alarming, and reporting capabilities.

The result is an unparalleled level of visibility and control.

**CVOSS Features**

With CVOSS Net2Phone has an end-to-end picture of an MSO's VoIP network, instantly, so that it can proactively identify and resolve the root cause of problems before callers even become aware of them. CVOSS includes:

- **Dashboard** – true real-time call level display of gateway, span, and call detail information, plus CMTS and MTA status, that enables operations staff to quickly identify and resolve problems.
- **Dialer** – end-to-end PSTN testing and analysis that captures all dimensions of the caller’s experience of your network, including voice quality and access testing.
- **Miner** – intelligent data reduction, analysis, alarming, and reporting that support service assurance, network troubleshooting, and fraud detection.
- **Portal** – web-based application that acts as a single interface for CVOSS components including subscriber management, reporting and data mining, and documentation.
Net2Phone’s QoS-based Service Benefits

- Speeds problem identification and resolution
- Provides centralized view of all key aspects of telephony service
- Enhances customer satisfaction, helping grow number of subscribers, number of calls, and minutes per call
- Supports addition of revenue-generating enhanced services
- Minimizes incremental spending on infrastructure and staff
- Compliant with industry standards – PacketCable and DOCSIS
- Enables reporting and analysis of critical indicators of service quality, as well as resource utilization, service usage and calling patterns.

CVOSS Differentiators

True Real-Time Monitoring

CVOSS is the only VoIP network management and monitoring solution that provides information in true real-time, not the “near real-time” inherent in polling-based approaches. To eliminate the overhead, delay, and lack of reliability associated with the Simple Network Management Protocol (SNMP), CVOSS uses a lightweight real-time network management protocol to collect network performance information directly from the Record Keeping Server to complement the information collected through traditional means. Net2Phone thus knows what is happening as it happens, so operations staff can immediately take required action—and thus minimize impact on customer satisfaction.

Network Call Level View

Telephony, of course, is all about subscribers making phone calls. However, in VoIP networks the concept of a “call”—two people speaking to one another—is often obscured by a focus on packets or network element status. CVOSS bridges the gap from packet metrics to telephony metrics, and gives operations staff a call-level view of your VoIP network. This enables them to see what’s most important to your business: how well you’re serving your customers. CVOSS uses call state and call detail information—including call setup, call connect, call disconnect, and end of call reason—and combines it with packet metrics to create actionable, call-level displays and reports. Your network is monitored and managed from a complete service perspective rather than from just a data perspective. Therefore, the callers who use your voice service, unconcerned with the intricacies of the underlying technology, will experience a high level of satisfaction.
End-to-End Visibility of Network Performance

CVOSS uses real-time event information for utilization and alarm displays on the Dashboard, and for analysis, correlation, reporting and alarming in the Miner. For a “wide angle” view of your network, CVOSS complements this information with performance and availability measurements provided by separately deployed quality probes: Dialers. Because this information is gathered from a user’s calling perspective, it provides accurate performance measurements of the overall solution. This network information supplies voice-related status as well as insight into the status and performance of the underlying HFC cable plant.

Highly Reliable and Scalable

Originally developed to support the worldwide operations of VoIP market leader Net2Phone, CVOSS has been enhanced for the cable environment in compliance with the PacketCable standard. So, it’s already proven in a production environment, handling tens of thousands of simultaneous calls across thousands of gateways. Data is collected from voice-related network elements and transmitted to a central collection server using a highly scalable message transport library. The system’s distributed architecture makes it easy to scale to larger, faster single systems, multiple CPUs, multiple systems, or multiple platforms. An Active/Active design and redundant hardware configuration ensure high availability. For example, if a process fails or is taken down for maintenance, its mated-pair process immediately takes over until the first process becomes available again. CVOSS also allows for hot in-service upgrades of software releases, operating system versions, and other components. It is important that the monitoring solution has high availability since it is during failure scenarios that you need it the most.

CVOSS Components

Dashboard – Know What’s Happening... Now!

Dashboard is a flexible client Graphical User Interface (GUI) that gives the network operations staff a contemporaneous view of the network and the callers using it. The ability to understand what’s happening is not gated by SNMP polling intervals or delayed by hourly or overnight report runs—operations staff know exactly what the callers are experiencing, now, so they can take required action before customer satisfaction is damaged.

CMTS’, MTAs, gateways, trunk lines (spans), and calls are all monitored by Dashboard. Operations staff can “drill down” into call activity and characteristics, VoIP-provisioned gateway trunk lines, and network segments. This gives them the power to rapidly isolate network problems and immediately take necessary action. For example, spans or gateways can be taken out of service for further investigation without disrupting call traffic.

A Call Status screen displays information about all calls currently in progress from an MTA or on a gateway span or cable segment. Users can view actual channel traffic on terminating gateway spans, check details for a selected call, disconnect an active call, and view call state statistics (e.g., number of calls dialing, talking, and so on). Administrators can also create Span Groups, or virtual collections of gateway spans, to make operators more effective by focusing only on spans of interest, but still gathering summary information of the entire solution.

Miner – Identifying the Root Cause of Problems

Call Management Servers, gateways and other packet network elements generate massive amounts of data. What’s missing is something to put the pieces of the puzzle together for a coherent, call-level view of the network that can be used to resolve problems. Miner imposes order on the chaos with data correlation, analysis, alarming, and reporting capabilities.
Miner collects and filters real-time call state information from the Record Keeping Server and from other probes (such as SNMP tools, dialers, ping tools, etc.) It conducts cross-component analysis, reduces the data, and provides meaningful "views" to identify clustering of failures. For example, it can enables easy identification of problems with specific originating or terminating gateways, gateway spans, or ingress or egress facilities.

Miner provides an array of useful, real-time reports on traffic patterns, network performance, and alarms. For example, it can show currently connected call volume across the network in a live display. Users can vary the time scale, show subsets of network connections, and select benchmark information—for example, a corresponding prior period—for comparison. Other reports show total minutes of use, average call duration; call source by destination, end-of-call reason, traffic summaries, and more. Reports show unusual call activity—long calls, call volume, call time, IP address activity, and dialed number call volume. It can also define threshold events so network administrators are alerted as appropriate.

Dialer – Triangulating End-to-End Quality

The ultimate test of a VoIP network is the experience of the callers who use it. Are calls delayed or blocked? How is voice quality? Dialer measures, analyzes, and reports on end-to-end call completion and voice transmission performance. Automated, centrally controlled probe units make test calls from MTAs on various fiber nodes and from different points on the PSTN network to assess quality on several dimensions:

- **End-to-end call availability and reliability.** Dialer calls other Dialer probes for an end-to-end record of post-dial delay, successful calls, and failed calls with the reason for failure.

- **End-to-end voice quality.** For connected calls, Dialer measures voice quality parameters such as end-to-end loss, echo metrics, and constructs a Mean Opinion Score (MOS) of voice quality using the industry-leading Perceptual Evaluation of Speech Quality (PESQ) algorithm, which is tuned for VoIP not just traditional TDM voice.

- **Ingress availability.** Dialer can call a supplied list of third-party access numbers used for off-net to on-net calling and verify that the calls are answered and routed correctly. In addition, Dialer reports post-dial delay and failed connections with the reason for failure.

Dialer’s graphical user interface is used to configure remote probes, define new tests, edit and launch existing tests, check test status, and view results. Tests can be run at a variety of intervals, and report results specified by scope (all tests run across the entire network, or broken down by calling locations, called locations, or test type) within a time period of interest.

Portal – Unified User Interface

Deploying a management system is only successful if the operations staff uses it effectively. The CVOSS Portal is a web-based application that provides a powerful yet user-friendly interface to the CVOSS components. Accessible from any browser yet designed to only allow access to approved users, the Portal collects many components of CVOSS into an easily navigable set of screens. The Portal includes three components critical to successful management of a real-world cable telephony deployment:

- **Subscriber Management.** At the core of the CVOSS Portal resides a transaction manager responsible for collecting subscriber data from the billing and provisioning systems and mediating that data across the various network elements.

- **Reporting and Data Mining.** The data mining functionality provides the MSO with historical reports useful in analyzing telephony date and identifying clustering of failures. These reports can be automated across any
combination of telephony metrics (Answer Seizure Ratio, End of Call Reason, etc.) and sources (CMTS, Carrier, Country Code, etc.).

**System Configuration.** The Portal provides an interface where users can define hosts, gateways, nodes, etc.

**Dialer Control and CVOSS Portal Administration.** These interfaces allow system administrators to set user permissions and access to the various Portal menus. In addition, users (with the appropriate permissions) may define new Dialer tests and view test results.

**Documentation.** The Portal allows support personnel to view regularly updated documentation and access an online help system (FAQs) that allow users to save information “bytes” based on their individual needs. Document examples include escalation procedures, engineering data, etc.

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**Exceed Caller Expectations & Enhance Your Bottom Line**

The outstanding, consistent level of service quality you’ll be able to achieve by relying on Net2Phone will help you add customers even faster than you had planned. Moreover, the customers you add will be happier with your service, reducing churn. Customers tend to talk longer if voice quality is better, so minutes of use per customer will grow. With Net2Phone’s service, you will achieve unparalleled control of your VoIP network, so you can roll out enhanced services with confidence. This increases revenue per billable minute. You’ll also reduce expense on the infrastructure “overbuild” that’s often a by-product of poor visibility into the network. Outsourcing to Net2Phone minimizes your Operations headcount, and puts experienced VoIP personnel in place to monitor the network. In addition, because it can proactively identify problems, you’ll get fewer customer complaints. That means you can minimize Customer Service staff and associated costs.

For more information about Net2Phone’s Cable telephony Solution, call 973-438-3075 info@net2phone.com