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Voice Quality Measurement in perfSONAR

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Abstract:

Speech service network hoping to provide a continuous data transfer procedure is a stable data streaming (Streaming). The main requirement in the Voice over IP technology is a good quality of transmitted signal between calling subscribers. Ways to diagnose voice quality issues has become important in your network. perfSONAR has been proposed as a successor to various traditional measurement tools. It is unprecedented ability to integrate measurement tools, data archives and visualization tools as web services provides a fully flexible and easy extensible solution to network measurement. In this paper, we develop a voice quality measurement in perfSONAR (ps-VQM). Combine the advantage of perfSONAR network effect supervision, availably supervise and control network effect, provide a high-quality network, just can develop the biggest advantage of network.

Keywords: VOIP; perfSONAR; Quality of speech.

1. Introduction

The times of the broadband network has been already come. Internet telephony (VOIP, Voice over IP) technique is mean to carry on the communication technique that the multimedia delivers through internet. Along with the fast development of the IP communication technique and the popularization of the broadband network, make the technique of the network communication of the application quickly expand to personal、Family and enterprise market is a rather important technique in recent years. perfSONAR [1] [2] is a services-oriented architecture. That means that the set of elementary functions have been isolated and can be provided by different entities

called services. All those services communicate with each other using well-defined protocols. Simplify supervision to manage a distant network and across domain complications. Therefore, in this paper, we develop a Voice Quality Measurement in perfSONAR (ps-VQM). Measure voice quality on backbone network based on perfSONAR structure, offers the ability for specialized, autonomous services to join under a common access scheme. Thus, it is possible to separate the roles of measurement, storage, processing, and visualization of data into specialized service instances.

Make internet supplier is able to ensure the quality of speech, insure provide a high quality service of the speech communication, and then raise user's satisfaction.

1.1. Voice Quality measurement

Measuring of signal quality can be performed by subjective or objective test [3] [4]. Subjective listening test is the most exact method for quality measurement. Mean Opinion Score (MOS) as one important metric for subjective. MOS is expressed as a single number in the range 1 to 5, where 1 is lowest perceived audio quality, and 5 is the highest perceived audio quality measurement, as shown in Table 1 below.

Table 1. Mean opinion score (MOS) [5]

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

2.1. perfSONAR

perfSONAR [6] is a web services-based infrastructure for collecting and publishing network performance monitoring. It is an infrastructure for network performance monitoring. The main purpose of perfSONAR is making it easier to solve end-to-end performance problems on paths crossing several networks. Mainly include of Measurement Point Service (MP) 、Measurement Archive Service (MA) 、Lookup Service (LS) 、Authentication Service (AS) 、Topology Service、Transformation Service、Resource Protector Service. These services are act as an intermediate layer, between the performance measurement tools and the diagnostic or visualization applications.

These services communicated with each other using the same protocol that has defined by perfSONAR. The protocol is based on SOAP XML messages and following the Open Grid Forum (OGF) Network Measurement Working Group (NM-WG) [7].

perfSONAR is a services-oriented architecture; the architecture of perfSONAR is shown in Figure 1. Measurement Points from the lowest layer in the system (Measurement Points Layer) and are responsible for measuring network metrics. Each measurement point deals with a specific metric (e.g., one-way delay, one-way-delay variation, packet loss,

utilization, available bandwidth).It is can use subjective or passive monitor. Because perfSONAR Web Services layer provide standard protocol, so that can let different domain data be able to exchange each other. User can use visualization tool to monitor network performance and capable of querying all available perfSONAR services deployed around the world.

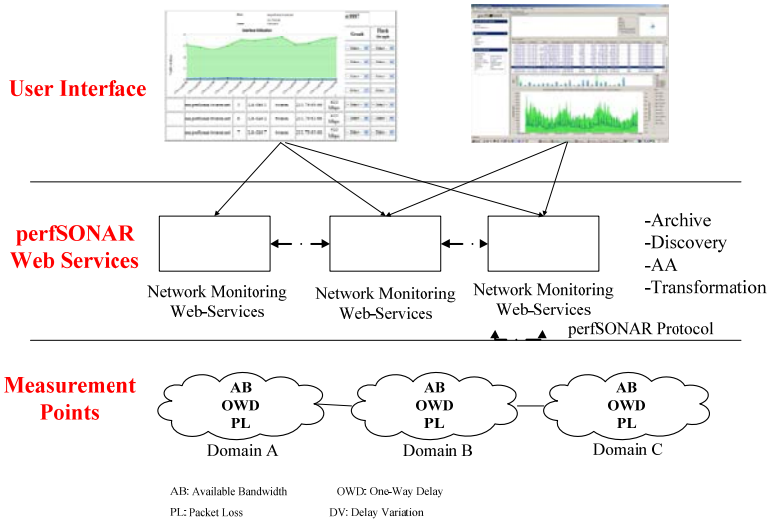

Figure 1. perfSONAR Architecture

2. SYSTEM DESIGN

This chapter will introduce the structure design of the system of ps-VQM. VQM is originally a command line application. This tool is used to measure the delay, jitter, bandwidth, packet loss rate over a simulated VoIP channel. We packaged the tool as a perfSONAR MP such that the voice quality measurement can be conducted in the perfSONAR environment.

2.1. System Architecture

The system architecture is shown in Figure 2. ps_VQM Measurement Point (ps_VQM MP) executes on-demand voice quality tests between two VQM tools. It provides Codec、Bandwidth、Delay、Jítter、MOS . When users request measurements between 2 hosts running the VQM tool from ps_VQM UI, the client sends an XML request to the ps_VQM MP. The ps_VQM MP then executes the measurement using the VQM tool and returns the requested data to the client in an XML response.

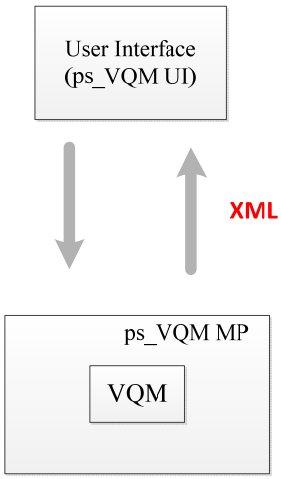

Figure 2. System Architecture

3. Implements

In our system, we have implement measurement point service 、measurement archive service and lookup service. All performance tests are performed via the ps_VQM measurement point (ps_VQM MP) and currently consist of regularly-scheduled tests to a configurable list of source and destination hosts or by the user demand, to test the voice quality. Measurement data include Codec、Bandwidth、Delay、Jitter、MOS. An example voice quality measurement is shown in Figure 3. The MOS is expressed as a single number in the range 1 to 5 (Bad、poor、fair、good、excellent), where 1 is lowest perceived audio quality, and 5 is the highest perceived audio quality measurement. Measurement data can now be saved to ps_VQM Measurement Archive (ps_VQM MA). ps_VQM MA exposes period measurement data in graph, making the results available through ps_VQM UI [9] [10]. As shown in Figure 4.

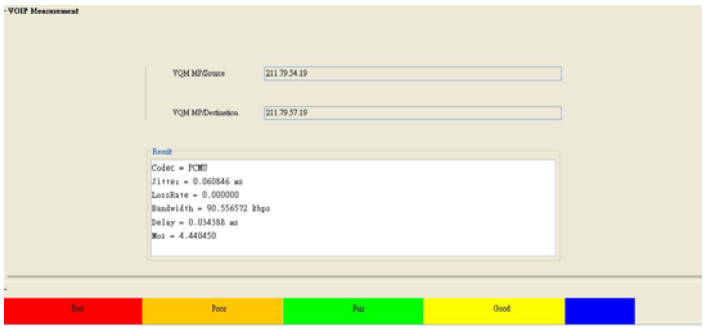

Figure 3. VOIP Measurement

Figure 4. Measurement Results

4. Conclusions

A major challenge facing VoIP developers is voice quality.In this paper, we develop a new system for voice quality measurement based on perfSONAR structure. Let user and backbone network manager can know the voice quality, help to find out the speech quality problems. According to the framework of our system is based on a Service Oriented Architecture (SOA), you don't need to have the whole set of services in your domain, you can use only a subset or use a service deployed by another domain. It is possible to add and remove components of the measurement infrastructure with a minimum effort of re-configuration.

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