

Business case for VoIP Readiness Network Assessment

Enterprises and equipment vendors are learning the value of a complete readiness assessment before deploying VoIP across an organization. The assessments are a critical step to a successful VoIP deployment, but many enterprises do not perform an assessment because of cost or because after performing a baseline on network utilization, they assume that their network has enough bandwidth to accommodate the voice traffic. This white paper explains why it is essential to perform a readiness assessment both for initial VoIP deployment and also for expansion projects to avoid unplanned additional costs and deployment delays.

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Overview

Over the past several years as enterprises have been deploying voice over IP (VoIP) with more frequency, many have learned the hard way that the first step in the VoIP lifecycle process should be a complete assessment of network readiness. Too often, IT organizations fall into the stereotype of “let’s put it on the network and see what happens.”

As convergence grows, the “let’s see what happens” approach with VoIP will almost certainly not be successful. While it is a data application at the core, VoIP does not act like traditional data applications. In addition, for most enterprises, VoIP will be the highest profile application on the infrastructure, meaning – if the phones do not work, everyone will know.

With early VoIP deployments many enterprises had major issues with initial rollouts. One key reason was a lack of pre-deployment assessment. When there were initial problems, there was “finger-pointing” between the enterprise, VoIP equipment vendors and service providers.

Today, most VoIP equipment vendors, who took most of the blame for poor performance, are now requiring network assessments even before they will sell or service the IP PBX and phone systems. While this is a good first step, many enterprises still do not perform comprehensive assessments.

This white paper will reinforce why readiness assessments are key for successful VoIP deployments. Pre-deployment assessments are the first step in a successful VoIP deployment, which also must include monitoring, management and optimization.

Different approaches to pre-deployment assessment:

Polling-based analysis

One approach uses the quantifiable usage of VoIP to estimate readiness. For example, an enterprise plans to use the G.711 codec and sets up the quality requirements. With these assumptions, each VoIP call might require 64 Kbps of bandwidth (actually, it is closer to 80 Kbps with the header information). Therefore, if a location is expecting five concurrent calls maximum, there should be at least 320 Kbps of bandwidth available just for VoIP.

With this approach, a polling-based solution will focus on using the existing infrastructure and polling standard MIBs which to trend utilization on each device. With this information, the enterprise can attempt to calculate how much bandwidth is available and/or needed for each location. Problems with this approach are the limited granularity of the information, the polling interval can skew and flatten the bursty nature of data applications, and the traffic is not broken down by application so there is no correlation of performance.

An example of this is monitoring two locations. Location A has a consistent 50% usage over the five-minute polling period. Location B has usage of 100% the first half of the period and 0% the second half (data traffic typically is bursty and has big spreads). A polling solution would say both locations have a 50% average. The skewing of the data could set a false sense of security because Location A may have plenty of bandwidth but Location B is bursting to maximum usage half of the time. If you deployed VoIP to Location B, there is a great likelihood of performance impact to both voice and data traffic.

The polling frequency can be increased, but there is a cost for this as well because it adds overhead to the network each time the poller requests data and the device responds. There is a fine line between getting more granular with polling and overburdening your network with management traffic.

Granular converged performance

Another approach, granular converged performance uses the quantifiable aspect of VoIP listed earlier, but with a different tactic. Instead of polling and averaging usage every 1 to 15 minutes, this approach focuses on detailed monitoring of the network and provides up to a 1-second level of granularity. For example, instead of one data point every 5 minutes with a polling based solution, 1-second granularity gives you 300 data points in the same 5-minute period so you are able to see peaks and valleys with bursty applications.

The benefit associated with this solution is the deep granularity it provides by actually monitoring and measuring every packet going across the network. One disadvantage with this approach is the requirement of a device or appliance at each location. It is impossible to collect this level of data and granularity without a dedicated appliance.

Simulated VoIP calls

With simulated VoIP call testing, traffic agents are used to generate simulated RTP (Real time Transport Protocol) traffic between themselves and measure the performance across the network. This approach provides detailed results of mean opinion score (MOS), jitter, packet loss and latency or delay for each call. From these results, the maximum number of calls (above a user defined MOS threshold) will be calculated. Then, the network performance is further validated to ensure the deployment can support the VoIP requirements under normal and peak situations by generating the maximum number of calls at specified intervals to ensure the voice traffic is not affected by data applications. The simulated calls need to be generated simultaneously from selected areas throughout the network and should also ensure that the additional voice traffic does not affect the performance of exiting applications. This process is typically run for two or more weeks and if there are no problems, the network is deemed ready and the assessment is over.

However it is necessary to consider the following:

- How long will it take from assessment to actual full deployment?
- What changes could affect your organization in the meantime – new users, new applications, increased usage, new locations?

These variables highlight why a single assessment is not sufficient.

If the calls are below quality metrics, then changes in the infrastructure should be made and another assessment performed prior to deployment. However, before making changes to the infrastructure, it is necessary to ascertain exactly what is contributing to the degradation in voice quality – without knowing whether the degradation is a result of jitter, delay or lost packets, it is impossible to determine where the changes need to be made. Consequently, enterprises require additional troubleshooting products to determine the root cause of the problem.

Other considerations for VoIP pre-deployment

In addition to performing an assessment to estimate the number of simultaneous calls and the expected call quality on the network, it is essential to assess the network topology to determine how devices are interconnected at both layer 2 and layer 3 and to verify VLAN configurations and device membership within those VLAN's.

Infrastructure devices also need to be evaluated to ensure they are capable of handling voice traffic and are correctly configured especially with regards to Quality of Service (QoS) policies or Class of Service (CoS) settings.

There are also other considerations outside the scope of this paper such as:

- Power over Ethernet (PoE) support
- Adequate cooling for the devices
- Sufficient CPU and memory capacity in infrastructure devices

Another major issue in today's converged world is that many enterprises are combining applications and networks, but are not bringing the voice, data, application, IT and infrastructure groups together. All too often the voice group needs to replace the legacy phone system and begins the migration to VoIP. The data or networking group may not be aware of impending change or the potential impact, and of course, everyday business continues where new applications and increased usage occurs.

The consequences of ignoring pre-deployment assessments

In addition to the obvious increase in costs caused by the need to perform post deployment troubleshooting which also results in full deployment delays, many enterprises understand that the network and applications are constantly changing. If the organization is paying several thousand dollars per site for a consulting assessment, they are not likely to do continuous assessments (assessments can range from \$2,000 (US) to tens of thousands of dollars, depending on size, complexity and length of evaluation). Additionally, several vendors will void assessments they completed, if changes – like new applications – occur on the network. In today's dynamic world, changes in the network happen frequently and now the enterprise's costly assessments are no longer valid and they must decide whether to reassess at the same cost.

So, organizations that want a successful first-time deployment must find a way to not only do an initial assessment for VoIP, but they must find a cost-effective and user-friendly way to continuously monitor readiness for VoIP in the bursty and high-demand converged networking area. Since VoIP deployments typically occur over a period of months or quarters, enterprises must consider how to carry out dynamic and on-demand assessments without raising the cost several times.

A solution to meet your VoIP assessment needs – NetAlly® Assessment and Troubleshooting Software

Whether you are planning a new VoIP deployment or an expansion to an existing deployment, it is essential you can determine:

- Whether your LAN and WAN circuits capable of handling the increased traffic from the VoIP deployment
- Are Quality of Service (QoS) policies correctly implemented
- The Mean Opinion Score (MOS) call quality you expect
- The major factor affecting voice call quality – delay, packet loss, jitter or Codec
- The number of concurrent VoIP calls can the network handle without impacting existing application performance

The NetAlly® Network Assessment and Troubleshooting Software quickly and automatically determines the network readiness for VoIP deployment and provides tools to identify and resolve service and readiness problems across the entire network.

As a network engineer responsible for VoIP deployment projects and network troubleshooting, NetAlly quickly identifies most of your network issues so that when VoIP deployment is started you are confident that you will not be faced with dissatisfied users complaining of poor call quality.

The NetAlly network pre-deployment assessment is specifically designed to assess the readiness of the network, and certify the performance for supporting VoIP applications prior to deploying VoIP traffic. The assessment process is divided into three different phases, each of which has a definite objective in the overall assessment scheme.

The Network Configuration phase checks aspects of the network and consists of three different tests

- Connectivity
- VoIP traffic precedence (QoS policy)
- Route quality and utilization measurements

The readiness assessment provides the most accurate picture of VoIP readiness for the network that is being tested by

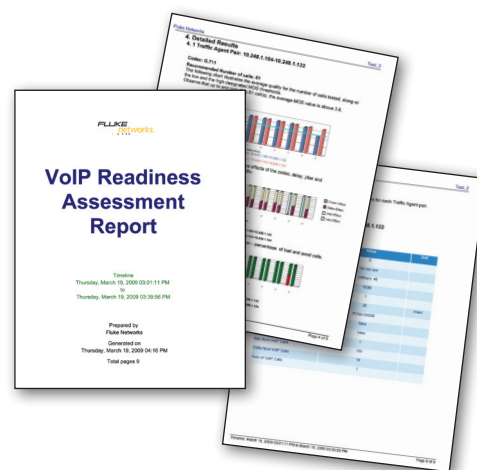
- Identifying the maximum call capacity
- Identifying major contributors to call quality degradation
- Validating existing capacity planning assumptions

End-to-end call quality is measured using the MOS scoring method. Synthetic calls can be mixed with real data traffic during normal production hours to get a real world assessment of service quality or scheduled for off-hours operation when critical business applications are not in use.

The performance certification test phase verifies the accuracy of the Readiness Assessment test data by emulating a fixed number of calls over an extensive period of time. This test makes it possible to assess VoIP performance according to time of day and day of week, under varying network traffic conditions.

Comprehensive reports are generated for each phase of the assessment process.

In addition to the analysis of primary measurements for VoIP traffic such as delay, jitter, loss and throughput, NetAlly is also capable of performing a variety of specialized troubleshooting tests with customized attributes to assist in identifying network and application performance issues. Troubleshooting tests can be performed between traffic agents or between traffic agents and application servers or hosts.



For in-depth troubleshooting during the pre-deployment assessment and during actual VoIP deployment, the OptiView® Network Analyzers can provide additional information by performing network topology discovery, switch configurations, VLAN configurations and switch port membership as well as being able to monitor the simulated voice traffic and identify the root cause of call quality degradation.

To complete the VoIP lifecycle process, post deployment monitoring can be provided by Visual Performance Manager, a network management solution that provides broad visibility and analysis into your network by consolidating views from multiple network sources into one seamless view tailored for each user's needs.

Conclusion

The success of VoIP deployment relies on many individual components and when one is not performing efficiently call quality will be degraded. The key to having a successful voice deployment is to build a strong foundation across the distributed enterprise. VoIP will raise the level of attention of poor performance because in the best-effort world of data applications, most users will never notice or complain if an Email takes 10 extra seconds to send or web applications are a little slow. However, with VoIP, users will immediately notice degradation and most likely complain. This increases the exposure and risk to your IT organization. This exposure adds to the criticality of ongoing performance management for both voice and data applications.

Don't take the risk of starting a live VoIP deployment without first conducting a network assessment – VoIP is just not another application on your network, VoIP has a number of unique requirements.

VoIP Resources:
NetAlly Product Information:
www.flukenetworks.com/netally
NetAlly Free Trial:
www.flukenetworks.com/netallytrial
VoIP Featured Topic:
www.flukenetworks.com/voip
OptiView product information:
www.flukenetworks.com/optiview

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Printed in U.S.A. 5/2009 3473080 D-ENG-N Rev A