

are **YOU** ready for IP telephony?

10 things to look for in your data network

IP Telephony is gaining momentum as many companies see the benefits of converging voice and data on baseband networks. Integrating voice, data and multimedia creates a global network that delivers great cost benefits with a scalable architecture.

Nortel Networks has long provided end-to-end speech quality and network management. Our success in delivering Internet Telephony is due to strong tools that develop architectures and merge systems to ensure they deliver consistent and reliable quality. We are evolving voice switches to become IP-enabled, and evolving IP networks to telephony-grade networks, thus transforming the Internet from today's primary applications — data and Web access — to new applications that provide rich interpersonal communications. There are some simple ways to determine whether this is the right time to implement

an IP Telephony solution. If you are adding sites to existing IP networks that may require voice or fax traffic as well as data connectivity, or if you are currently leasing separate lines for interoffice data and voice/fax traffic, you are probably a good candidate for IP Telephony.

Before implementing this exciting technology, customers want to be assured of quality that meets the standards for clarity and reliability that have been the norm in traditional circuit-switched networks for decades. There are some important considerations to be taken into account before deciding that you are able to convert your data network to a converged network in this way.

1. Latency and Packet Loss

High Latency — the time delay on traffic — is less acceptable with voice than with data traffic. Thus, you should measure and characterize end-to-end latency and packet loss for the IP Telephony traffic class across your network. Whether the results are acceptable or not depend on the quality of voice expected and amount of bandwidth usage; there are also strict requirements on the type of codec and end-to-end packet loss and delay.

For example, consider the G.729 standard voice-encoding algorithm. To obtain a reasonable voice quality based on G.729 delays, there must be less than 150-200 ms for packet loss values of 1 - 2%. In other words, 98 - 99% of the packets

**NORTEL
NETWORKS™**

How the world shares ideas.

must traverse the IP network within 50-100 ms, assuming a 100 ms endpoint delay budget. If bandwidth usage is not a concern, implementing the G.711 standard will provide good quality at end-to-end delay values of 200-300 ms, and packet loss levels of 2 - 3%.

2. Recognition of the 802.1P Standard

It is highly recommended that your wiring closet have the ability to recognize the 802.1P protocol, for traffic prioritization at Layer 2. This may not be necessary if you have an underutilized, fast Ethernet network with abundant bandwidth. Routing switches, which are Layer 3 aware, have the ability to recognize DSCP (diffserve code points); these are good to have but not a requirement.

3. Ability to Prioritize at Layer 3

The core data network needs to be able to provide Layer 3 priority. It is probably optimal to recognize DiffServ, an IETF standard for differentiated classes of service for various types of applications and business requirements. However, routers with priority queuing capability should be fine for the initial deployment.

4. IP Telephony Call Patterns

To prepare yourself with a picture of your total traffic patterns after IP Telephony is implemented, you should determine what the telephony call patterns will be like across the IP infrastructure. The current telephony usage patterns of your enterprise should give you a very good starting point.

5. Determine WAN Utilization before Voice is added

To fully determine the ability to carry voice over long distance, you should examine WAN utilization. To do this, have the WAN running no more than 85% utilization at peak traffic. The acceptable percentage of voice traffic should be engineered for each transmission link in the IP network, and should be estimated based on telephony usage of the particular enterprise.

6. Traffic Patterns and Peak Utilization

To better manage the addition of voice traffic on the network, you should be aware of network traffic patterns at different times of day. Examine traffic patterns over a defined time period to determine peaks times in network utilization, such as monthly “roll ups” or end-of-quarter processing.

7. Link Speed and Voice Quality

The speed of network links — connections between devices — will impact voice quality. Low speed links (under 256K) will need proper handling and may introduce lower voice qualities. Consider the possible impact of Voice over IP (VoIP) bandwidth on the data flows on the same links.

8. Network Congestion and Drop Packets

You need to be aware of any areas of your network that are prone to congestion. Examine areas of network congestion and measure your IP switches and routers for the degree of:

- Drop packets and re-transmissions
- Queue exhaustion
- Ingress and egress delay, and
- CPU utilization.

You also need to evaluate where to place the Connection Managers. Placing them in well-managed areas with easy access and high reliability is highly recommended.

9. Reliability of the Network Infrastructure

When it comes to telephony, users expect to get a dial tone! You should be very careful to determine the reliability of the infrastructure; for example, LAN Mean Time Between Failure (MTBF), router functions, and recovery. You should also check the network powering standards. A redundant power supply may be indicated to ensure certainty of operation.

10. Policy Servers

Finally, you should consider your strategic direction on Policy Servers. Although not absolutely required prior to implementing VoIP, Policy Servers are a good strategy for supporting different level of services on an IP network.

Summary

There are great benefits to adding telephony to your existing IP network. However, there are a number of technical points that should be considered before implementing this conversion. Your network may already be able to handle voice, or you may need to make preparations in the areas outlined here before achieving optimal cost and maintenance savings through voice and data integration.



How the world shares ideas.

For more sales and product information, please call 1-800-822-9638.

United States

1-800-822-9638

Canada

1-800-466-7835

Europe, Middle East, and Africa

33-4-92-96-69-66

Asia Pacific

65-287-2877

Caribbean and Latin America

954-851-8000

<http://www.nortelnetworks.com>

*Nortel Networks, the Nortel Networks logo, the Globemark, and How the World Shares Ideas are trademarks of Nortel Networks.
© 2000 Nortel Networks. All rights reserved. All other trademarks are the property of their respective owners. Information subject to change.
Nortel Networks reserves the right to make changes, without notice, in equipment design as engineering or manufacturing methods warrant.