

Migration to IP Telephony

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INTRODUCTION

There are mainly two types of used communication systems; circuit switched and packet switched networks. In circuit switched networks, there must be a dedicated path and a sequence of connected links between the calling and called stations. A connection with the proper resources has to be established prior to the start of information exchange. An example of circuit switched network is the phone network. On the other hand, packet switched networks rely on allowing multiple communicating end systems to share the entire or part of a path simultaneously. The Internet, a world wide computer network, is based on the concept of packet switching empowered by the Internet Protocol (IP). IP is basically a transmission mechanism used by devices communicating in a network as part of a protocol suite.

IP telephony is a technology based on the integration of telephony and other services with packet switched data network. IP telephony utilizes packet switched networks and implies multimedia (voice, video, and data) communication over IP or as it is often called converged services [Ibe, 2001; IP Telephony Group of Experts, 2001] allowing simultaneous communication between devices such as computers or IP phones. IP telephony becomes a very popular concept and an important technology that defines communication between individuals and organizations, public, and private [Gillett, Lehr, & Osorio, 2000]. Converged voice, video, and data IP based telephony is considered to be relatively new with respect to circuit switched telephone systems; however it is already being recognized as one of the current revolutionary technologies of the 21st century.

Several public and private institutions in different countries are considering to migrate their telephone systems from legacy circuit switching to packet switching using IP telephony. In most cases, a public institution has two separate networks: data and voice. The voice network can be depicted as one central office with many other branch offices scattered over

one or more states, countries, or cities. Typically, these branch offices within a limited geographical region are connected to each other and to the central office via limited bandwidth leased telephone lines provided by the Public Switched Telephone Network (PSTN) for a particular cost. In some cases, where the branch offices are scattered beyond the geographical limits allowed, there is a complete disconnect between these branches and phone communications will be made at the cost of long distance calls.

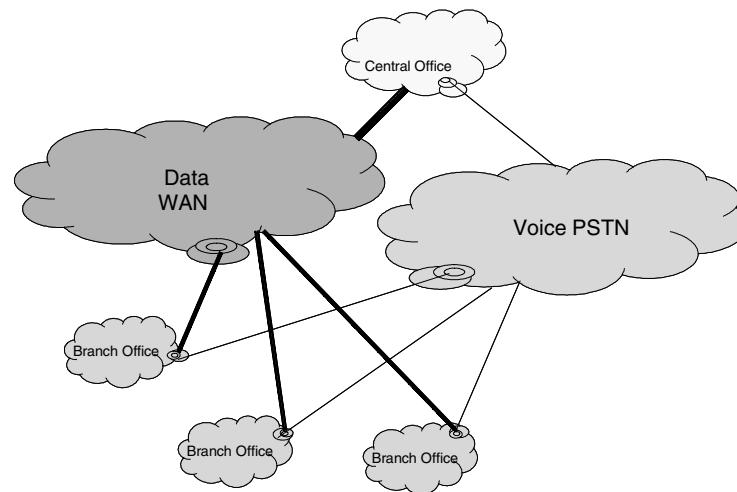
In general, most organizations have a LAN for data traffic within the central office which is extended via the local carrier company data network to other branch offices over leased lines or Permanent Virtual Circuits (PVCs) composing the MAN of the organization. This network is only used for the transport of data, with no voice traffic transferred over it regardless of its capabilities. Figure 1 shows a typical current networking infrastructure of an institution with multiple sites in different regions.

The goal of any institution is to integrate voice, video, and data over a single network infrastructure while maintaining quality, reliability, and affordability. Converged voice, video, and data Internet protocol based telephone systems are currently being thought of and accepted as the next generation platform replacing legacy PBX telephone system which has been providing us with great and reliable services over the last decades. A well built and designed LAN/WAN infrastructure is the key to providing acceptable, scalable, reliable, and affordable IP telephony (Keagy, 2000; Lacava, 2002).

MIGRATION PATHS

Today there exist two trends to replace the legacy PBX system and migrate to IP telephony: Converged IP-PBX and IP-PBX. The IP-PBX system can be described as a voice communication system that supports IP telephony operations and functions using fully integrated system design elements, both hard-

Figure 1. A typical network for a multi site institution



ware and software utilizing a LAN/WAN infrastructure of an organization (Insight Research Corporation, 2003). This type of a system or solution is being mostly favored by packet switched or data network equipment makers.

The Converged IP-PBX system is based on a circuit-switched network design, but can be equipped with fully integrated media gateway port interface circuit cards to support IP stations and IP trunk ports. The Converged IP-PBX is best described as a bridge between the legacy PBX system and the IP-PBX system. This type of a system/solution is being favored by circuit switched equipment (legacy PBX) makers.

Each of these systems carries its own advantages and disadvantages which will vary based on the proposed implementation and the use of the system (Considerations IDC Executive Brief, 2002). Both systems are being offered and sold by many telecom vendors like Cisco, Nortel, Lucent, Avaya, Alcatel, Siemens, and so on; however, the migration path to any of the two new systems is a unique process that is dependent on many factors (Yankee, Group, 2003). Accordingly, to switch from a traditional circuit switching infrastructure to IP telephony, there are two converging paths, IP-PBX and Converged IP-PBX; however, a mixed solution that can utilize the best of both paths is possible (Cisco systems, 2000; Lucent technology, 2003; Nortel Networks white paper, 2003; Thurston, Hall, & Kwiatkowski, 2002).

A chosen solution, that will provide converged services over IP, must scale to PSTN call volumes, offer PSTN call quality, reliability, and equivalent services. It must also support new and innovative significant other optional services. The choice of any solution is usually coupled with cost justification, not just based on the initial cost of investment, but also based on the long term savings on capital cost, operations, and maintenance as well as other realized factors such as work productivity, work time saving, travel expenses, employee retention, and so on (Cisco Systems, 2001; O'Malley, 2003).

IP-PBX: FEASIBILITY, ADVANTAGES AND RESERVATIONS

The IP-PBX solution fully utilizes a packet switched network for the deployment of integrated services over a private enterprise WAN network (Christensen, 2001).

Feasibility

This solution can apply best for some situations such as:

1. A green field investment, where a new building is being considered.
2. Building a new or upgrading the infrastructure of a data network including LANs, due to the exponential growth of data network.

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