Multimedia CTI Services for Telecommunication Systems

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Abstract: Computer telephony combines telephone and computer technologies to allow information exchange. In telecommunication systems, CTI (Computer Telephony Integration) applications support multimedia constraints such as, the synchronization of audio and video flows in videoconference systems. This paper presents the CTI and our experience in developing CTI services for a vocal server.

Keywords: CTI, Vocal Server, Telecommunication, Multimedia, Networks.

1. Introduction

Computer Telephony Integration (CTI) is the marriage between telecommunication and computer. For a lot of companies CTI will play a strategic role for their future business.

Historically, CTI has been accepted and used since the late 1980s in a proprietary form or another, although technologists have been working to integrate the computer and telecommunication since the 1970s. Original CTI applications were really only viable for high-volume applications, such as large-scale call centers where the telephony is the critical interface between an organization and its customers. Also, until now, users of call center technology had other issues to deal with, making CTI not priority.

Today CTI applications integrate computers, multimedia and telephone constraints. CTI and multimedia applications use the same sources of information (voice, data, video) and must be able to access distributed data in a network environment.

A media represents an information which can be a text, a sound, a video, a picture or a file. Moving pictures use a lot of computer resources and then temporal constraints appear. Multimedia particularly comes from the merge of television and computer, and integrates, at the same time, data coming from text, graphic, sound, picture, video, etc. Multimedia or CTI systems are often distributed and use many servers or telecommunication servers to store pictures, sounds, texts and movies in databases. So multimedia or CTI applications must upload data located in several servers.

Today there is a lot of multimedia applications which imply different constraints such as transfer and management constraints. A multimedia application uses different types of data which must be synchronized [2], [16], [20], [24] (for example the synchronization of audio and video streams in

a teleconference system). The need of synchronization mechanisms and communication architectures in the network is also very important for multimedia applications [11], [12], [17], [22], [23].
So many multimedia constraints appear in CTI environments [3], [6], [10], [18].

The synchronization of computer and telephony functions manages telephone and computers. A well-designed CTI architecture, including the application programming interface (API) and underlying operating system components, brings immense benefits to all segments of the CT (Computer Telephony) industry. Many APIs, such as Microsoft TAPI (Telephony API) or Novell TSAPI (Telephony Services API) allow implementation of CTI functions [9], [14], [15], [19], The success of Microsoft TAPI and Novell TSAPI provides a powerful solution for calls centers [4], [5]. Thus for many companies, these tools begin to be very important for their business.

A large number of technologies are used to store, retrieve and manipulate computer-based information over a telephone network. These technologies include voice processing, telephone network interfaces, facsimile (fax), Automatic Speech Recognition (ASR), etc.

CTI applications run on ATM networks, Isochronous Ethernet, ISDN, etc. ATM (Asynchronous Transfer Mode) is a modern telecommunication switching technique, not only limited to telephone switching but allows transmission of different signal types such as, data and video. Then ATM networks can be used for multimedia and telecommunication applications [1], [7], [8].

2. Evolution of CTI architectures

The objectives of CTI applications can be decomposed as follows:

- optimization of office work with combination of telephones and computers,
- reduction of communication management cost,
- improvement of telephone reception with the utilization of computer and telephone capabilities.

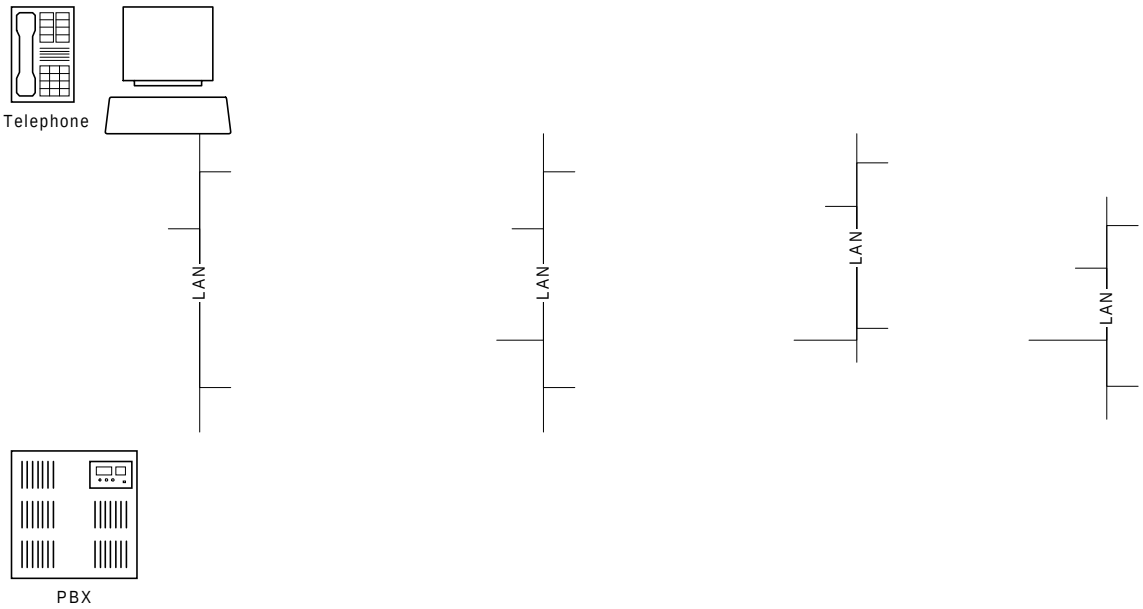
Different possibilities to link telephone and computer can be described (see figure 1):

A) In the first applications, the terminal was connected to the PBX through a serial link or a telephone adapter. But in this architecture, CTI functions are limited to telephone capabilities such as transfer, wait, etc ... Thus, all applications are telephone-oriented. A terminal can also be connected to the PBX and to the telephone via a card which controls and manages the PBX and the telephone.

B) The telephone is connected to the PBX, which is connected to a network server via one or several links with cards allowing to manage several links. These cards are inserted in the server. The information exchange between the terminal and the server is achieved through the Local Area Network.

C) Some new servers begin to take the place of the PBX. These new servers have the same capabilities than the PBX and begin to be enough powerful to take into account all PBX capabilities (today a lot of PBX are built around computer equipment). Thus, PBX try to offer more and more intelligent services allowing to integrate CTI functions and can be compared to a computer.

D) In intelligent networks, all multimedia information will be integrated in a same computer. For example, the synchronization of audio and video and use of high-speed networks allow to guarantee the required QoS. All these information will be transferred through the Local Area Network to the server. For some technical raisons (such as the lack of bandwidth in existing networks), these architectures are not used.


Telephone
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OFFENDING COMMAND: 1.!

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