Computer Telephony Integration (CTI)

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Abstract — Computer Telephony Integration (CTI) is a key technology within the field of customer relationship management. By combining the reliability and pervasiveness of the telephone with the processing power of the computer, it is possible to improve significantly the productivity of call centers and the customer experience. The purpose of this presentation is to explore the technologies behind CTI. It provides a brief introduction to the components of CTI and shows how they can be used to provide an effective management of in-bound and out-bound calls within a call centre. It also explores the increasing use of the internet as a point of contact, and shows how an integrated call centre can make use of a wide variety of contact points to produce a unique and consistent experience for the customer.

Keywords: Telephony, Automatic Number Identification, Automatic Dialing, First-party Call Control, Third-party Call Control, Caller Line Identification

I. INTRODUCTION

Computer telephony integration, also called computer-telephone integration or CTI, is a common name for any technology that allows interactions on a telephone and a computer to be integrated or coordinated. The term is predominantly used to describe desktop-based interaction for helping users be more efficient, though it can also refer to server-based functionality.

A. Why to Integrate Telephony and IT Systems

A traditional telephone system, such as a PABX, does not have computer telephony integration. When an incoming call is received, it routes it to the first available caller in sequence. When answering a call using a traditional telephone system, the user first interviews the callers to find out who the caller is and what he or she wants. All these take time and, if not properly handled, annoy the caller who may be a customer. If the caller is an existing customer, the staff has to manually pull out the caller’s customer profile before proceeding with further interaction with the customer. This is not efficient.

With computer telephony integration, the system is able to identify whether the caller is an existing customer and the system automatically fetches the customer profile from the backend databases. As soon as the call is routed to the agent (or user), the computer monitor simultaneously flashes the customer profile as a screen popup. This does away with the need for the agent to interview the caller and effectively eradicates the time required for the agent to manually search for the customer profile. The agent is able to attend to the caller straightaway.

II. CTI TYPES

CTI applications tend to run on either a user's desktop, or a server.

A. Common desktop functions provided by CTI applications

- Call information display caller’s number (Automatic number identification), number dialed (DNIS), and Screen population on answer, with or without using calling line data.
- Automatic dialing and computer controlled dialing (fast dial, preview, and predictive dialer/predictive dial.)
- Phone control (answer, hang up, hold, conference, etc.), and advanced functions such as call routing, reporting functions, automation of desktop activities, and multi-channel blending of phone, e-mail, and web requests
- Transfers, coordinated phone and data transfers between two parties (i.e., pass on the Screen pop with the call.).
- Call center, allows users to log in as a call center agent and control their agent state (Ready, Busy, Not ready, Break, etc.).

B. Common server functions provided by CTI applications

- Call routing, the automatic routing of calls to a new destination based on criteria normally involving a database lookup of the caller's number (ANI) or number dialed (DNIS).
- Advanced call reporting functions, using the detailed data that comes from CTI to provide better-than-normal call reporting.
- Voice recording integration, using data from CTI to enrich the data stored against recorded calls.

III. FORMS OF CTI

Generally, there are two forms of CTI.

A. First-party call control:

First party call control operates as if there is a direct connection between the user's computer and the phone set. An example of this would be a modem card in a desktop computer, or a phone plugged directly into the computer. Typically, only the computer associated with the phone can control it, by sending command directly to the phone. The computer can control all the functions of the phone, normally at the computer user's direction. First party call
control is the easiest to implement but is not suited to large scale applications such as call centers.

B. Third-party call control:

Third-party call control is more difficult to implement and often requires a dedicated telephony server to interface between the telephone network and the computer network. Third party call control works by sending commands from a user's computer to a telephony server, which in turn controls the phone centrally. Specifically, the user's computer has no direct connection to the phone set, which is actually controlled by an external device. Information about a phone call can be displayed on the corresponding computer workstation's screen while instructions to control the phone can be sent from the computer to the telephone network. Any computer in the network has the potential to control any phone in the telephone system. The phone does not need to be attached directly to the user's computer, although it may physically be integrated into the computer (such as a Voice over Internet Protocol soft phone), requiring only a microphone and headset in the circuit, without even a keypad, to connect to the telephone network.

IV. CTI Standards

- **CSTA (Computer-Supported Telephony Application):** It is an ECMA (European Computer Manufacturers Association) standard for computer telephony integration which has been approved by the ITU.
- **TSAPI (Telephony Service Application Program Interface):** It is an AT&T/Lucen/Novell standard for computer telephony integration.
- **TAPI (Telephony Applications Program Interface):** It is the Microsoft standard for computer telephony integration.

A. **CTI Type Function Details**

1) **Automatic Number Identification:**

ANI (Automatic Number Identification) is a service that provides the receiver of a telephone call with the number of the calling phone. The method of providing this information is determined by the service provider. In a call center, ANI displays the number of the calling party to the call center agent in real time. Among other things, the call center can use the information to forward calls to different people for different geographic areas.

2) **Dialled Number Identification Service:**

DNIS is a service sold by telecommunications companies to corporate clients that lets them determine which telephone number was dialed by a customer. This is useful in determining how to answer an inbound call. The telephone company sends a DNIS number to the client phone system during the call setup.

For example, a company may have a different toll-free telephone number for each product line it sells. If a call center is handling calls for multiple product lines, the switch that receives the call can analyze the DNIS and play an appropriate recorded greeting. A company may also use multiple toll free numbers for multilingual customer support, for which each support language is associated with a dedicated toll free number.

3) **Screen population:**

In call centers that provide integration between a telephone system and an agent's desktop, a screen pop is a window or dialog box that autonomously appears on the desktop, displaying information for a call simultaneously sent to that agent's telephone.

For inbound calls, the data displayed typically contains call information such as:

- Caller Line Identification (CLI)
- Automatic number identification (ANI)
- Dialed Number Identification Service (DNIS)
- Information entered from an Interactive voice response (IVR) system

For outbound calls, the data displayed typically contains information that was sent to the outbound dialer as part of the customer call record.

4) **Automatic Dialing:**

An auto dialer is an electronic device or software that automatically dials telephone numbers. Once the call has been answered, the auto dialer either plays a recorded message or connects the call to a live person.

When an auto dialer plays a pre-recorded message, it's often called "voice broadcasting", or "robocalling". When an auto dialer connects an answered call to a live agent, it is often called a "predictive dialer" or "power dialer".

5) **Predictive Dialer:**

A predictive dialer dials a list of telephone numbers and connects answered calls to people making calls, often referred to as agents. Predictive dialers use statistical algorithms to minimize the time that agents spend waiting between conversations, while minimizing the occurrence of someone answering when no agent is available.

Predictive Dialers are used in call centers to increase productivity and decrease agent average idle time. Predictive dialing is a system of outbound calling that dials without the agent being on the line. The system dials a phone number, listens and when a live "hello" is detected, automatically transfers the call quickly to an available agent. The predictive dialer places numerous calls simultaneously, checking each number for a live "hello". If the call is busy, no answer, not working, etc., the dialer either discards or reschedules the call and then dials another number.

The dialer is predictive because it anticipates when the next agent will become available and when the next "hello" will be detected. They also take into account how many agents are working and adjust the number of calls dialed accordingly.