VIP Customers Management System in Bulgarian Telecommunication Company

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***Abstract* - BTC have developed a CRM System guaranteeing the automation of all main processes related to the company's relations with corporate customers. CRM System is established as an integrated platform including following supports: Centralized Database of all Customers, Managing Sales Processes, Processing Customer Complaints and Giving Information. For centralization and automation of the relations with the Customers, CRM System develops IP Contact Center.**

***Keywords* - Customer Relationship Management /CRM/, Internet Protocol Contact Center /IPCC/, Intelligent Contact Management /ICM/, Cisco Call Manager /CCM/, Interactive Voice Response /IVR/.**

I. INTRODUCTION

BTC is the incumbent operator in Bulgaria and provides telecommunications services with a national coverage. The company wishes to improve the way of key customer care in view of the retention of their loyalty throughout the forthcoming liberalization of the telecommunications market in Bulgaria.

The system covers a limited number of key customers of BTC in the first phase of the implementation. Subsequently the number of key customers will gradually increase till the system encompasses all business customers of the Company.

II. IPCC COMPONENTS

Using Cisco and Microsoft technologies, Cisco IPCC contains the following components:

ICM System

ICM system is dedicated to call routing and also logs calls to the main ICM database. This combined Router and Logger is called a "Rogger".

CCM

CCM software provides traditional PBX telephony features and functions (basic call processing, signalling, and connection services) to packet telephony devices such as Cisco IP phones and Voice over IP Gateways /VoIP Gateways/. Supplementary and enhanced services - including hold, transfer, forward, conference, automatic route selection, speed dial, last-number redial, and more - are also provided.

IVR

Within the IPCC, an IVR can act as a queue point, a routing client, as a managed resource and as an information source for consolidated real-time and historical reports. If an appropriate agent is not available when a call is received, the IPCC utilizes the IVR for call treatment such as playing

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announcements, collecting digits, or offering alternate routing options before redirecting the call to a targeted answering resource.

In our system the IVR is used to gather customer-profile information, to complete transactions, or to queue calls.

Peripheral Gateways

A Peripheral Gateway /PG/ provides an interface between ICM software and a system peripheral. Each PG tracks events on a per-agent and per-contact basis, ensuring the most accurate routing decisions possible.

The IPCC includes following PG software:

CCM PG

The CCM PG provides the interface to the CCM from the ICM. It provides information on incoming calls from the CCM into the ICM call router. It also provides information from the CCM to the ICM Controller, on the status of all Agents connected to the CCM.

IVR PG

The IVR PG provides the interface between the ICM system and the IVR subsystem and facilitates the routing of calls and data to or from the IVR system. The PG provides information to the Central Controller of the status of all IVR Ports /Agents/. In addition, it passes all the Customer entered data, collected at the IVR for the call, back to the ICM.

Computer Telephony Integration /CTI/, CTI Object Server /CTIOS/ PG

The CTI/CTIOS PG provides an interface between the ICM system and workstations or server-based applications, thereby facilitating the integration of calls and call-related data with these applications. The CTI/CTIOS PG runs the CTI/CTIOS Server component of ICM. Client applications that need to make use of the functions provided by the CTI/CTIOS Gateway, call these functions via a CTI/CTIOS Client component.

Call History System

The Call History System is configured to replicate a pre-defined set of call information from the main ICM Logger database and store it in the Historical database. This database can then be used to generate reports analysing call activity over time, performing trend analyses etc.

Agent Workstation Clarify Client

The Agent workstation Clarify client software provides the Agents with the application functionality that they require to process incoming customer calls. In order to utilize functions of the ICM system, these workstations run a program developed to communicate between the Clarify CRM desktop and the ICM via the CTI/CTIOS Server.

Admin Workstations

The Admin Workstations provide facilities for monitoring and administering the ICM System and for generating reports. Webview Admin Workstations are used to access
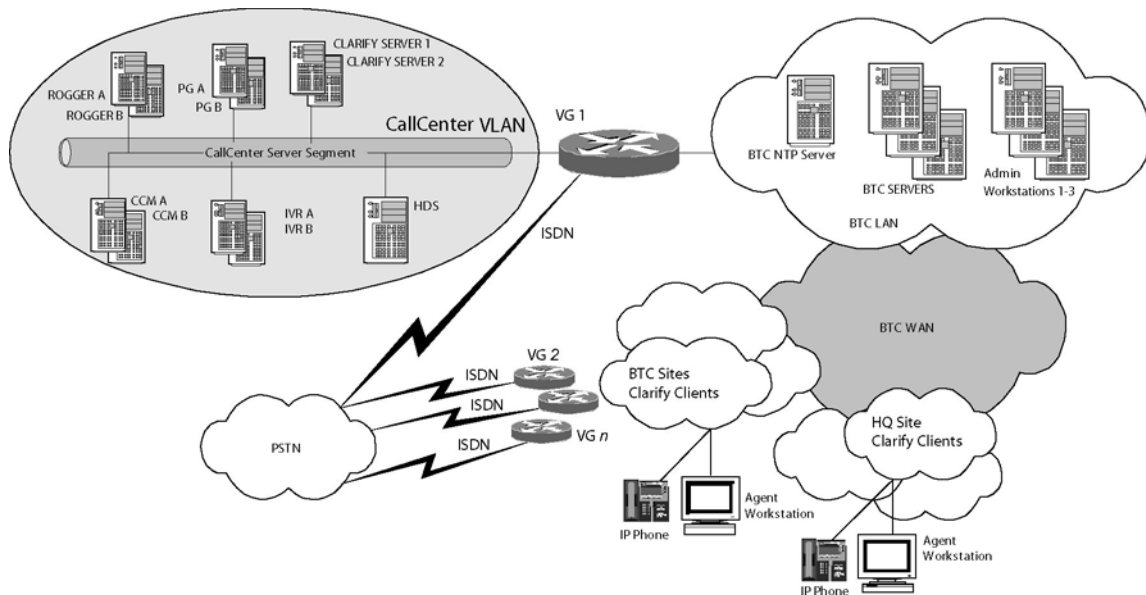
Fig. 1. IPCC Infrastructure

administration functions, including scripting and report generation, over an Intranet using a Web browser.

The Agents connected to the IPCC utilize the Cisco IP Telephone 7940. This full-featured, second-generation voice instrument uses IP transport technology to permit the consolidation of data and voice into a single network infrastructure.

VoIP Gateways

The VoIP Gateways are used as interfaces between Public Switched Telephone Network and IP Network.

III. IPCC INFRASTRUCTURE

The network diagram of the IPCC structure is given in Fig.1. As shown in Fig. 1, a Failover IPCC System replicates all the components of the Primary system so that all data is also available in the event of a failover situation occurring.

IV. BTC APPLICATION CALL FLOW

The developed application consists of the following components:

Agent Logon/Logoff

The Agents "log on" to the Clarify desktop client application, which in turn notifies the ICM system which creates a real-time table associating the Agent number with the IP Phone handset IP address and the Desktop Workstation IP address. The Agents will have already been set up in the ICM with Agent ID, Name, skill sets and password.

ICM Call Routing

The ICM controls the incoming call from when it arrives at the Gateway to when the Customer disconnects. Cisco ICM software provides the central intelligence for call routing.

The routing are:

All calls requesting "Sales" are routed to an Agent with Sales as a primary skill set if available, if not route to Agent with Sales as secondary skills.

Cisco IP Telephones

All calls requesting "Complaints" are routed to an Agent with Complaints as a primary skill set if available, if not route to Agent with Complaints as secondary skills.

All calls requesting "Information" are routed to an Agent with Information as a primary skill set if available, if not route to Agent with Information as secondary skills.

All other calls are routed to an multi-skilled Agent.

IVR Functions

In this application the IVR is used to gather customer-profile information (via database lookup), to complete transactions, or to queue calls.

Database Lookup

As part of the process for gathering information on which to base call routing decisions, the ICM/IPCC needs to access suitable Customer records. The Clarify Oracle Database contains detailed records and history for all the Customers that will call the BTC Contact Center. This database could be accessed from either the ICM or the IVR. The IVR scripts that have been developed make a database lookup to Clarify Oracle Database based on a variety of information, either from the call context (ANI, DNIS…), or customer provided via Caller Entered Digits (CED).

Interface with Clarify Desktop

The Cisco IPCC (IP Contact Center) gathers information from a number of different sources:

From the telephony network: Caller number (ANI or CLI), called number (DNIS)…

From the caller themselves via IVR and Caller Entered Data (CED): e.g. Customer account number

From database lookups generated by either IVR or ICM call Routing scripts.

A Clarify CRM system uses Clarify desktop thick clients. The easiest, quickest and safest way to access this client from/to another application is by using Dynamic Data Exchange (DDE).

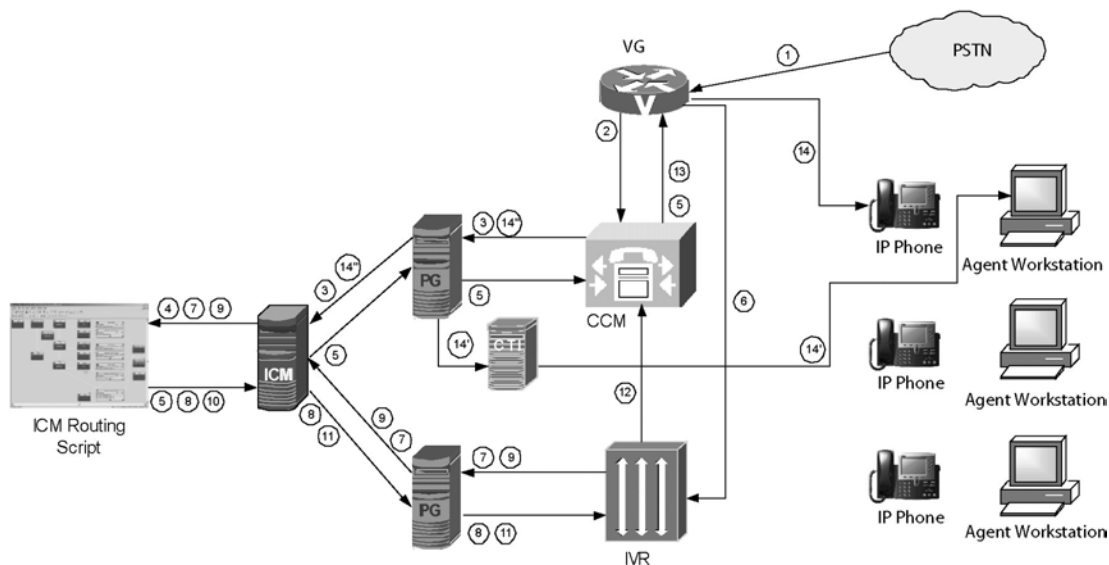Clarify Driver has been developed as an interface

Fig. 2. Customer incoming call flow

application, accessing Cisco ICM through CTI OS ActiveX component and the Clarify desktop thick client via DDE.

Reporting

Enterprise wide Reporting is facilitated via Admin Workstations. The standard IPCC system reports, both real-time and historical, are available - info on specific skill groups, services, peripherals, routes end scripts. Historical data are stored in the ICM central database at five- and 30-minute intervals. In addition, tools are provided for developing custom reports.

Customer call follows the call flow shown in Fig. 2 and contents the steps described below.

Step 1: A customer dials a BTC telephone number that terminates on a port on Cisco 3660 VoIP Gateway.

Step 2: The VoIP Gateway forwards the customer call to CCM.

Step 3: The CCM, using ICM PG, sends a Route Request to ICM Rogger.

Step 4: The ICM Router, based on dialed number, and follow CallType CT_IncomingCall, runs script IncomingCall.

Step 5: The ICM script, using Translational Route, sends message to the VoIP Gateway (via PG and CCM) to transfer the call to one of IVR servers.

Step 6: The VoIP Gateway sends the customer call to the selected IVR server.

Step 7: The IVR sends a REQUEST_INSTRUCTION request to the ICM Router informing the ICM that a call has arrived at the IVR and is awaiting queue instructions.

Step 8: The ICM script sends a RUN_SCRIPT request to the IVR containing a script number that instructs the IVR what queue treatment should be provided to the caller.

Step 9: The IVR performs a database lookup on Customer ANI aqainst the Clarify Oracle database and sends a RUN_SCRIPT_RESULT message to the ICM Router indicating that the specified script has been executed and attaches the call variables with the results.

Step 8' and 9': The steps 8 and 9 are repeated so many times as the ICM script instructs.

Step 10: The ICM script decides to send the call to an available agent.

Step 11: The ICM Router sends a CONNECT request to the IVR containing the destination label of the device target.

Step 12: The IVR interprets the label and sends a re-direct request message to the CCM requesting the CCM to redirect the call to the particular extension (dialed number).

Step 13: The CCM finds the IP phone with the line that maps to the dialed number. The CCM associates the dialed number with an IP Address for the agent phone (all IP phones register with a CM and update it with their current IP address). The CCM will direct the VoIP Gateway to redirect the RTP stream to the agent's extension.

Step 14: The VoIP Gateway and IP Phone begin sending voice RTP streams to each other.

Step 14': CTI information is sent to Clarify Desktop through CTI server.

Step 14": Call information is returned back to ICM for some statistics.

V.   CONCLUSION

In the next phases CRM System should have interfaces to and from BTC Systems associated with customer servicing: Regional Systems for Customer Care and Network Description (ISOM/RILA) and Regional Billing Systems (ISOA).

The IPCC can be extended and used for other BTC Systems. For example the IPCC service Customer Calls about Intelligent Network problems.

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