SOLUTION OF FUCTIONAL INTEGRATION, ACQUIISION, TRANSMITION AND OUT WORKING OF INFORMATION AT "EV-net"

B. Miljkovic, Company "Elektrovojvodina" Novi Sad, Power distribution Sombor, SCG
M. Popovic, Institute for computing, automation, measurement FTN Novi Sad, SCG
A. Stojicevic, Institute MICRONAS NIIT, Novi Sad, SCG

ABSTRACT

In the surrounding of classical call centres the quality of voice-based communication between a customer and an agent and communication between the employed inside the company is poor. Since mass customisation is becoming more and more important as a marketing strategy, companies have to produce highly specialised and individualised products and give much better supplies. To satisfy these customer demands manufacturers, suppliers, and retailers build networks and connect their application systems. These e-commerce techniques are considerable assets in speeding up the inter-company co-ordination process. In this paper an approach is discussed that supports distribution of power energy, but in logically integrated business processes, where complex and hard to standardise data occur, by applying e-commerce techniques as a Voice Call Center, Turowski (1). By doing so, the inter-company data exchange, planning, and coordination of the production process in case of mass customization and VCC services are improved.

INTRODUCTION

Since beginning of electification at the end of 19th century till the end of 20th century electrical industry was working as a strictly regulated monopol and that period can be considered as the regulation era. At the end of 20th century, first forms of deregulation and breaking strict monopols in the field of production and selling power energy were started, so these trends will mark the dvelopment of electrical industry at the beginning of 21th century.
Deregulation and establishment of power energy market changes a great extent, the ways of business and especially the approach to the customers i.e. the buyers of power energy.Thus the customers – buyers of power energy are in the focus of our attention and all activities are focused to them.
In the new circumstances, where production, transmition and distribution of power energy is clearly defined and seperated, each power distribution, as the last one in the chain of distribution to the final consumers – buyers, has to work out a special strategy to them to keep them. Thus power distribution faces both the buyers and the transmission and producers of power energy – suppliers. Everybody in the chain the producer – the buyer, has a direct impact on the quality of the delivered energy. Power distribution i.e. the one which is directly connected with the consumer – buyer bears the final consequences.

Miljkovic Boza, dipl.ing.el., tel. 025/24-399/213, Fax: 025/29-399
E-mail: boza.miljkovic@so.ev.co.yu

So it is very important to establish a continual and a good quality connection between the two factors. One of the possible solutions is implementacion of Electronic Virtual Center (Virtual Call Center–VCC). VCC is tool to provide a good quality customer care, but it also provides an efficient and fast echange of information with the producer. Thus the management has the information about quantities, qualities the "goods" and adequately work in case of some misunderstandings or dissatisfaction.
VCC enables continual approach to the actual system condition and possibilities of delivering power energy, as well as to the plans and commercial arrangements i.e. offers. All the information can be found on different locations and services. Therefore, applicative systems which unite the approach to the information, are developed. Also one of the advantages of VCC is that it unites physical level of transmission ways for echange information (Internet, Intranet, public phone network, …). In realizing these functions, various solutions are intergrated as classical agent services, system of automatic voice messages, intelligent network and so on.
Thus "on-line" two way channel between the buyers and retailers is realised at any hierarchy level so any buyer can describe and present his demands and problems, and receive an offer and price for the asked service in return.

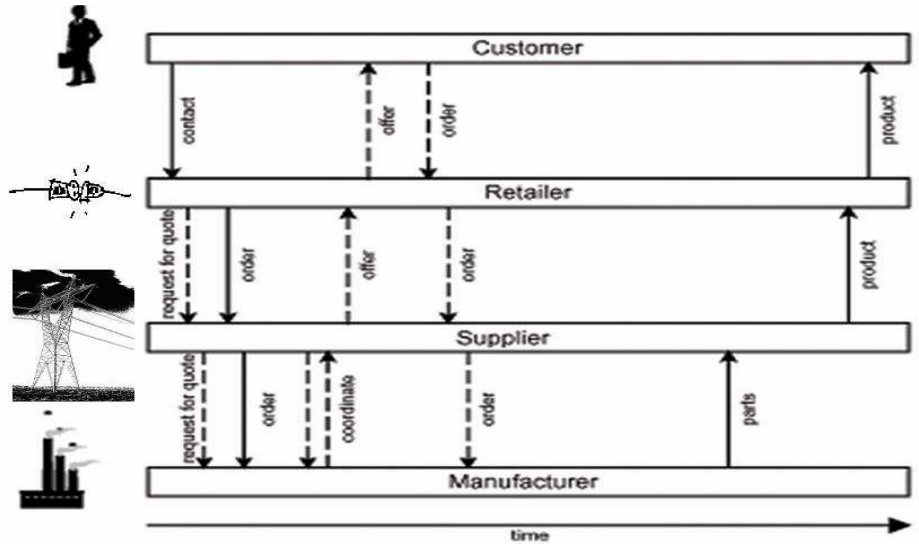


Figure 1: Exemplary interactions necessary for sale, production and distribution, (1)

The Call Center is becoming the most powerful tool in satisfying customers` expectations and managers use it for sending/receiving important data to/from consumers and suppliers using several different channels:

- Inbound and outbound phone calls (classical or mobile telephony),
- Fax, and
- Web-based avaliable interaction (Web-TV, Web-Cam, Web-phone, Web-PC, Web-Wearable etc.)

Call center in this activity needs additional and new operation processes for servic new tipe of users.

VIRTUAL CALL CENTER - VCC

Virtual Call Center is complex communicating system, which services calls in cases when number of them at time, is huge. Virtual Call Center is based on internet/intranet network. Problems, solved in Virtual Call Center, which existed in classical call centers, are:

- End users, like developers of programming solutions are deeply dependent on manufacture equipment
- It is possible to contact classical call center only from PSTN, other networks are inaccessible like entry points
- Quality of communication is on low level, because only audio communication is possible
- Corresponding ACD (Automatic Call Distributor module) is closed (very hard to make functional extensions and capacity extensions)

Virtual Call Center appreciates two categories of end users:

- Analog users (classical phone device inbound and outbound)
- Digital users (have BRI/PRI ISDN access inbound and outbound), and

Miljkovic Boza, dipl.ing.el., tel. 025/24-399/213, Fax: 025/29-399
E-mail: boza.miljkovic@so.ev.co.yu

- Internet users (Internet phone, inbound IP phone, Intranet users, Internet users, etc.), Popovic and group of authors (2)

Service which are enabled are:

- Phone calls across PSTN network
- Inbound phone calls – extension
- Video phone – extension and Intranet calls
- DB service request
- Service of system for control and protect of buildings and equipment – events on objects inside the companies and outer
- View in state of power distribution network – SCADA system
- E-mail services
- Voice Mail services
- AOM (Administration, Operation & Maintenance), Miljkovic and Popovic (3)

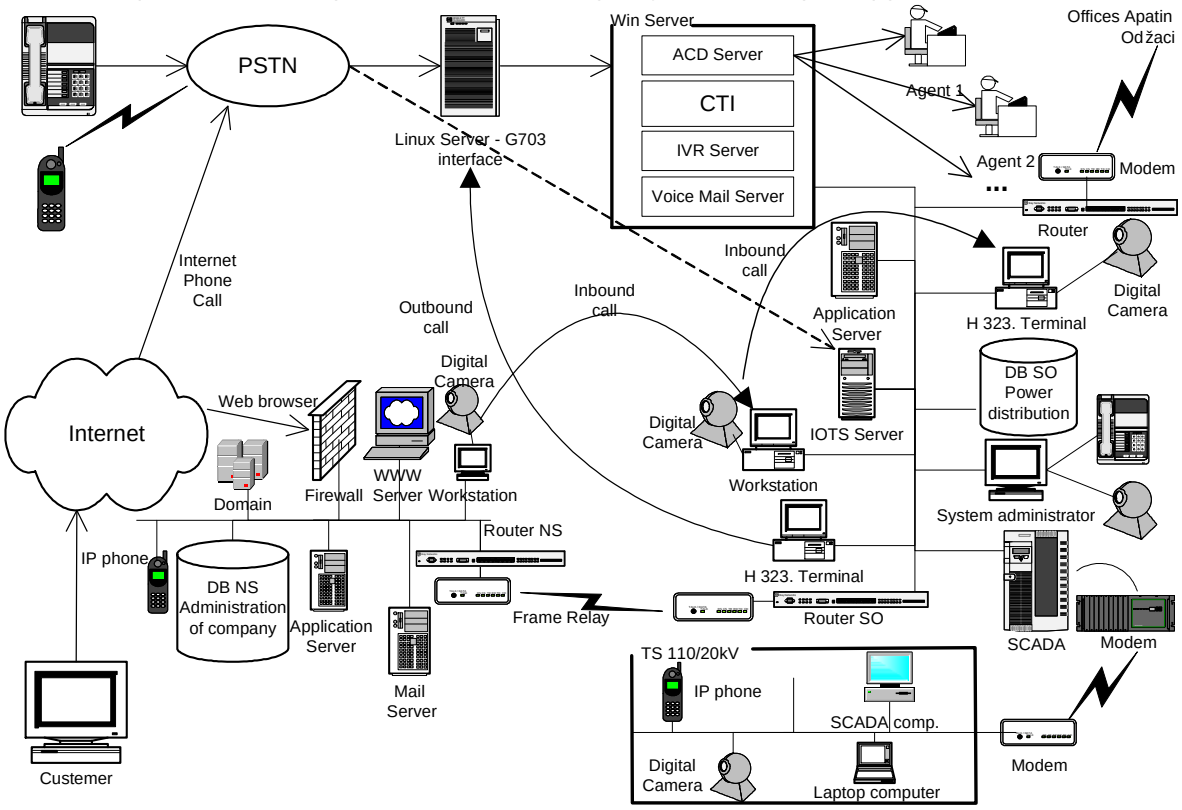


Figure 2: Architecture of Virtual Call Center

With this approach, VCC has become unique browser and interface for all services. On Figure 2, Architecture of Virtual Call Center eventually needs to extend system with new services independent of agent's call control. Call control is implemented in Virtual Call Center based on ITU-T Q.71 model of call control.

ELEMENTS AND BENEFITS OF USING VCC

System of call center must have three components for success full installation: knowledge base, component, component of handle query and communication component. In Figure 2, integration of these components and of other custom care functions – buyers of power energy. The example of a global, hypothetical model of market power energy organization in Figure 3 shows the necessary development and connection of all the three components and setting them into function of all the participants in business, in order to satisfy the final customers. It is impossible to realize the control of appearing complex processes and fulfilment of more and more complex demands from one place, with partial or "Off-line" information. So, large customers, such as big corporations or service providers, profit from spanning their data and applications over several data centers, potentially owned by different organizations, combining the resources of these centers. Customers tend to use only part of

Miljkovic Boza, dipl.ing.el., tel. 025/24-399/213, Fax: 025/29-399
E-mail: boza.miljkovic@so.ev.co.yu

the resources and services of a data center to which they outsourced their IT infrastructure. The virtual centers extend the customer's capability to optimize the center for their business needs and for particular workloads hiding the actual platform architecture and providing a much simpler and convenient virtual architecture called a Virtual Data Center transparently bridging traditional geographic and organizational data center boundaries. Graupner, Kotov, Trinks (4)

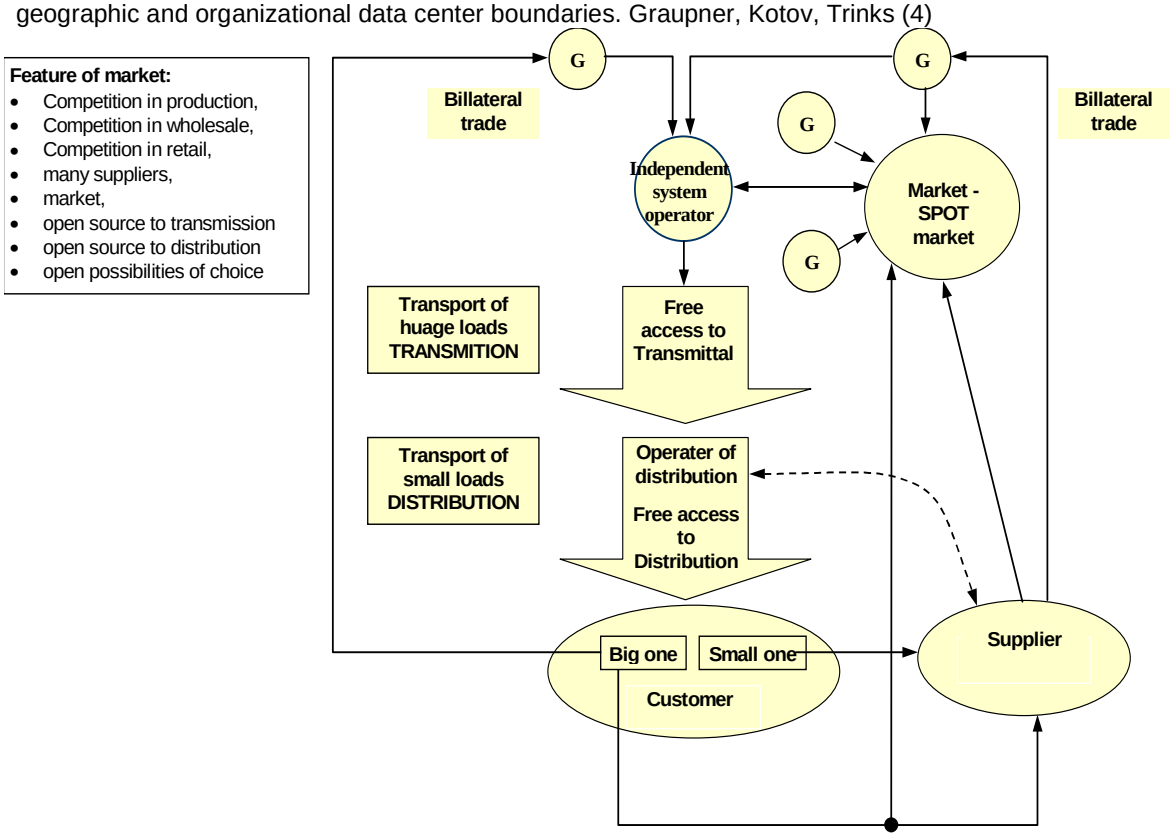


Figure 3: Complex chain of business in liberalized power distribution, Katic and Strezoski (5)

The base of automatized Electical Power distribution system

The basic points of management in business of Electric Power Distribution “Elektrovojvodina” are:

- Date base servers of Business Information System, BIS
- Date base servers of Technical Information System, TIS
- Date base servers of Supervisory Control And Data Acquisition, SCADA
- Web servers
- E-mail servers
- Server with registration function of radio or phone communications in power distribution
- IOTS servers for view in built state (“Infotel”)
- Operator of funcional radio communication – dispatcher
- Operator of PBX system
- Operator of system for control and protect of buildings and equipments

By introducing the VCC system as an integration framework of computing and other distributed information-processing techniques we enabled the integration of user software in a center for distribution of calls/requests (quires of any kind). VCC based on Internet techniques, so clients can used it through PSTN, Internet, Intranet network (local calls) or LAN.

Functions realized by installing VCC

Implantation and installation of VCC in power distribution the information are enableed 24 hour on day and 7 days on week, bout of customer and management, whithout involve more employs or overtime work. It`s hapend with using next functions:

- ADS, Automatic Call Distributor (method one queue for N servers)

Miljkovic Boza, dipl.ing.el., tel. 025/24-399/213, Fax: 025/29-399
E-mail: boza.miljkovic@so.ev.co.yu

- IVR, Interactive Voice Response provides sound or video messages (welcome notes or calling side)
- IOTS Integrated Office Telephony System
- Voice mail, provides possibility to leave voice messages to the service/agent if a service/agent isn't accessible at the moment and play back of voice messages by a service/agent
- Transfer or parking/unparking of incoming calls
- Possibility to define individual services
- Agents are independent of work place and/or working PC
- The same agent can work in more then one service
- Monitoring, statistics and week scheduling of agent's work
- Local calls - between agents inside of Intranet (PBX functionality, Intranet became infrastructure of PBX parallel with existent classical infrastructures)
- Outgoing/incoming calls to/from PSTN through PSTN Gateway (converting DSS1 to internal Q.71-based signalization and vice versa)
- Outgoing/incoming calls to/from Internet and Intranet (H.323 based) through H.323 Gateway (converting DSS1 to internal Q.71 based signalization and vice versa). Popovic and Kovacevic (6)

Functionality which made operators:

- Activate on selected service
- Pause on selected service
- Park/Unpark of incoming calls
- Transfer of incoming calls
- Make outgoing call
- "Reading" voice mail

INTERNT-BASED VIRTUAL CALL CENTER IMPLEMENTATION

Relation between call and device represent state of connection. When we have call on device, than state of connection changed. Way of change tracked through report of events. Changing one state to other are starting with manual acts of user or any CTI service started over border of services.

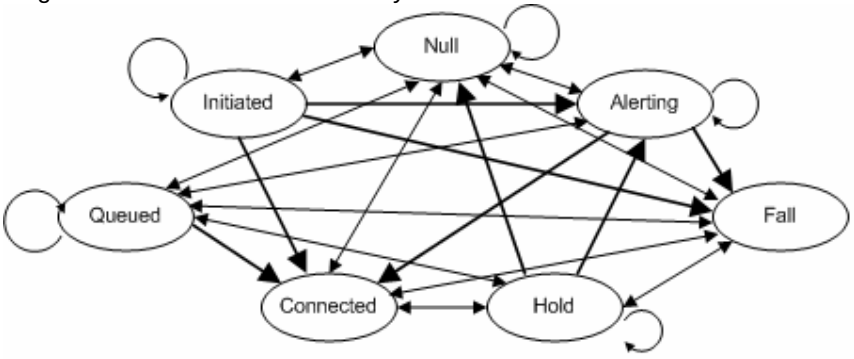


Figure 4: Model of state connections, (7) Encyclopaedia

Definitions of connections states are not considering in this moment, but for this paper as the most interesting implementation details and examples are selected:

- Local voice call (i.e. virtual PBX call) processing
- PSTN inbound (incoming) call processing
- Intranet inbound call processing,

Special case in this paper is request to handle all types of calls to Integrated Office Telephony System IOTS. An IOTS IVR application was developed using TSAPI to support various voice services, including audio-text and billing record query. When a call arrives, the IVR first asks the caller (customer) to provide his/her PIN number (in our case its ID customers` number). IOTS uses this number to access the customer's profile stored in the database, and then provides the voice services. To connect a customer to an agent, the IVR application returns call control to IOTS/ACD with a message indicating the campaign (group) of the call and the information about how to distribute the call. For example, if the caller is a VIP, then the call may be processed by a dedicated agent with high priority.

Miljkovic Boza, dipl.ing.el., tel. 025/24-399/213, Fax: 025/29-399
E-mail: boza.miljkovic@so.ev.co.yu

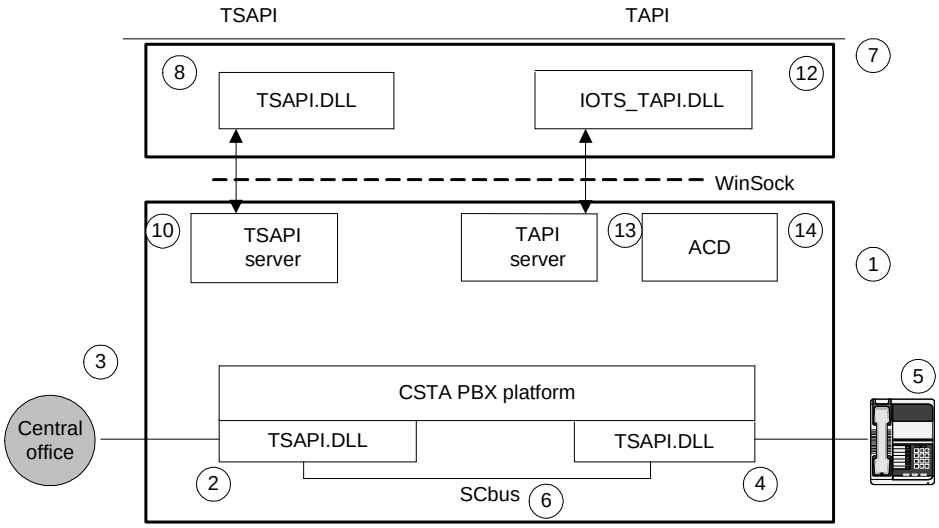


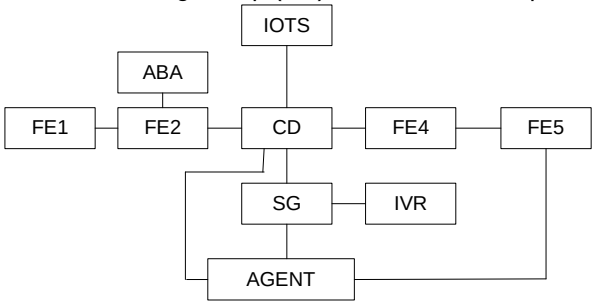
Figure 5: The functional architecture of IOTS system, Sheng-Lin, Yi-Bing (8)

An example how IOTS call center handles a viewing in the state of account query issued by customer of power distribution.

- Customer (Fig. 5 (3)) makes a call to the IOTS call center. The customer call is first served by the IVR system and then is transferred to the CTI server (Fig. 5 (1)) as the customer presses some digits and attempts to talk with a live agent. The customer ID and any information (e.g., IVR-profile) collected by the IVR system will follow the call and be carried to the CTI server.
- The CTI server examines the IVR-profile of the call request and checks the customer profile stored in the customer database if exist. The CTI server decides how and where to distribute the call by checking the agents available information. For example, for a VIP customer, it should not be queued for too much time or it should be handled by a dedicated agent (Fig. 5 (7); the call setup process may involve (10) and (8) for TSAPI or (13) and (12) for TAPI). The CTI server may also select an appropriate agent to which the call request should be routed according to the service type requested. The call can even be routed to the same agent in case the customer just hung up a previous call several minutes ago.
- If all agents are busy, the CTI server passes the call to the ACD (Fig. 5 (14)) and the call is put to a proper queue. If the call is assigned to an available agent, the ACD notifies the CTI server. As it is being notified, the CTI server then passes the customer profile and request service data to the agent's desktop so the customer data can appear on the agent's screen as it receives the call.
- During the agent service period, the agent may request another agent (e.g., the supervisor) to join the call conference or just transfer the call to the new agent. In this case, the customer's data will appear on the new agent's screen at the same time.
- As the customer hangs up the call, the CTI server then updates the service information in the database and decides when to call back the customer for follow-up if necessary.

The components involved in a local call processing are the following according to ITU-T Q.71: FE1, FE2, FE4, and FE5

- AB analysis (ABA) component. This component analyses calling and called party numbers.
- IVR (Interactive Voice Response) component. This component plays RANs (Recorded Announcements) to a user/subscriber, and accepts his selections.
- IOTS Integrated Office Telephony System
- Call Distributor (CD), Service working Group (SG), and AGENT components.



Miljkovic Boza, dipl.ing.el., tel. 025/24-399/213, Fax: 025/29-399
E-mail: boza.miljkovic@so.ev.co.yu

Figure 6: The static component relations for a local call processing.

The standard Q.71 FE1-FE2-FE4-FE5 structure has been extended with ABA for B analysis, CD, SG, and AG for ACD functionality, IVR for interactive voice response functionality and IOTS for database query.

The most important aspect of the Intranet-related component interaction is the usage of IP multicasting. IP multicasting is used for three purposes. The first one is for playing an announcement and/or music to the calling party, as follows:

- "PLAY_REQ" (play request) message is sent, using IP multicasting, to all active IVRs, which are registered in the corresponding multicast group. It should be noticed that at least one IVR must be active, but there is a possibility to have more of them in the system.
- IVRs replay with the "PLAY ACCEPTED" message, using IP unicast.
- The IVR, which replied first, is going to service a call. It will receive the "PLAY" message. Other IVRs will receive the "DISCONNECT" message.

The second usage of IP multicasting is the following. When a call is released, SG that is involved in its processing should advertise the availability of the agent, which serviced the call. The third is for IOTS i.e. for transfer request query to database.

One more aspect of the Internet-related component interaction has to be clarified. That aspect addresses information (voice) connection establishing and release (open and close). This phase of call processing is handled by H.245 protocol. When a new call arrives into the call center, it comes to CTI server. CTI server together with IVR and selected H.323 agent will process the signaling phase of the call up to the point in which the CTI server sends "REPORT" message to the H.323 client (i.e. new call from PSTN). After that point H.323 client and agent should solely open information channel using H.245 protocol. Involvement of neither CTI server nor IVR is needed in order to establish the information channel between the PSTN subscribers and call center agent. (2)

The components involved in an inbound call processing are the following:

- Q.71: FE6, FE4, and FE5
- AB analysis (ABA)
- IVR
- CD, SG, and AG
- IOTS.

Static component relations are shown in Figure 8. Standard Q.71 FE6-FE4-FE5 structure has been extended with ABA for B analysis, CD, SG, and AG for ACD functionality with IVR for interactive voice recognition, and IOTS for uses number to access the customer's profile stored in the database or to make some other query.

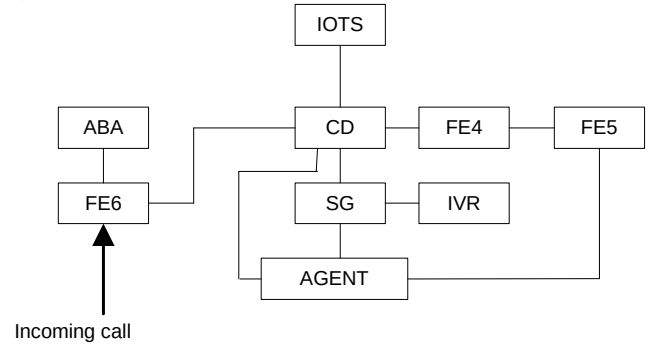


Figure 8. The static component relations for a PSTN inbound call processing

Dynamic component relations are very similar to those already shown in Figure 6. FE6 plays a role similar to FE2 in local call processing. The difference is the additional interaction of FE6 with the PSTN gateway.

CONCLUSIONS

In this paper we have presented our approach to Internet-based virtual call center implementation. We described needs, the concepts, the most interesting implementation details, and the pilot installation in surround of potential new organisation of power distribution. We think that is the perspective solution for all companies, special them who have branches and offices around the region, country or world.

Miljkovic Boza, dipl.ing.el., tel. 025/24-399/213, Fax: 025/29-399
E-mail: boza.miljkovic@so.ev.co.yu

VCC uses a unique “EV-net” infrastructure of company “Elektrovovodina”, so any sale request can be re-routed to any agent in the system and to be serviced in the best possible way without undertaking any additional activities.
VCC is user-friendly surround and it’s easy for use for all, customers, employers or managers. The biggest advantages this Call centre is his prefix “Virtual”.
The virtual centers extend the customer's capability to optimize the center for their business needs and for particular workloads hiding the actual platform architecture and providing a much simpler and convenient virtual architecture called a Virtual Data Center transparently bridging traditional geographic and organizational data center boundaries. (4)

THE KEY WORDS

Virtual call center- mass customisation-custom care

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Miljkovic Boza, dipl.ing.el., tel. 025/24-399/213, Fax: 025/29-399
E-mail: boza.miljkovic@so.ev.co.yu