Role of Contact Center for Smart Cities

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ABSTRACT

Smart city is a strategic entity that comprises of modern urban production factors in a common framework and highlights the growing importance of Information and Communication Technologies (ICTs). Telecommunications service providers have strengths and assets that can be utilized to bring the dream of a smart city environment into reality. This leads to a strong move that serves the needs of society by ensuring E-Governance rather than conventional setup of Governance. Establishing a customer contact centre is just the first part of the process of optimal digitalization of municipal operations and interactions with citizens. This research highlights how a contact center helps to achieve few goals of a by providing significant facilities to citizens.

1. INTRODUCTION

The world is increasingly instrumented, interconnected, and that all of its entities are getting smart. [1] A *Smart City* focuses on its main areas that are Information, Water, Energy, Mobility, Production, and Citizens.

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SMART projects of different fields include:

   a. Energy Automation and Control

   b. Transportation: Vehicles using natural gas/biofuels/hydrogen, contactless Card and near field communication (NFC) payment, information panels (GPS), accessible buses + Blind System

   c. Smart Mobility: Planning of bus routes, bus monitoring web-real-time, traffic control centre, comprehensive system of access to the historical, regulatory system of surface parking, contactless smart card, information on shelters, Quick Response (QR) codes, augmented reality

   d. Mobility Road: Closed Circuit Television CCTV System, Centralized Traffic Control

   e. Intelligent Buildings

   f. Electronic Government: Online processing, management of government entities, applicant's console, technology platform regarding citizenship, integrated management of municipal assets

   g. Open Government: Open Data Portal for information sharing and data mapping for the public interest (in development), communication strategy, transparency, citizen contact (Open Government Area)

   h. Urban Environment Observation

In Karachi following projects may be implemented:

- **Smart Energy**: Street lights, traffic lights network, energy remote management, etc.
- **Smart Mobility**: Planning of bus routes, bus monitoring web-real-time, traffic control centre, comprehensive system of access to the city center, regulatory system of surface parking, contact less card, information on shelters, etc.
- **Smart Environment**: telemetric network of acoustic limiters, urban indicator system
- **Smart Living**: Management and control of remote operations, WIMAX network for tourist cameras, etc.
- **Urban Planning**: Rehabilitation of buildings, regulations for the installation of generation systems by renewable energy sources

2. OBJECTIVE OF SMARTCITY

[1], [2], Ultimately, the main objective is culmination of Karachi towards 'Smart City' to raise the technological jobs. The object of the investment activities is focused on the horizontality of the city features under an exclusive, safe and efficient platform. There is a platform required which monitors each subsystems of all the municipal departments in one place and it make sure that all sections should be fully operational, well managed and they should create enough contribution in the economics growth of country. Online municipal procedures should be available and provided by the City to its citizens and also the processes should contain well-defined action protocols in municipal areas. These performances bring together a unified control center, equipped with the "intelligence" to manage the processes and generate quality data to external companies to provide services and applications, create jobs and enable effective interaction with the society.

3. ELEMENTS OF THE SMARTCITY

A Control Center of 'SmartCity' equipped with cutting-edge equipment, including:

- Balanced Scorecard (BSC) - a management tool
- Systems and Decision Support (DSS)
- Executive Information Systems (EIS)
- redundant computer equipment
- Control and Alarm Systems
- Highly-qualified team

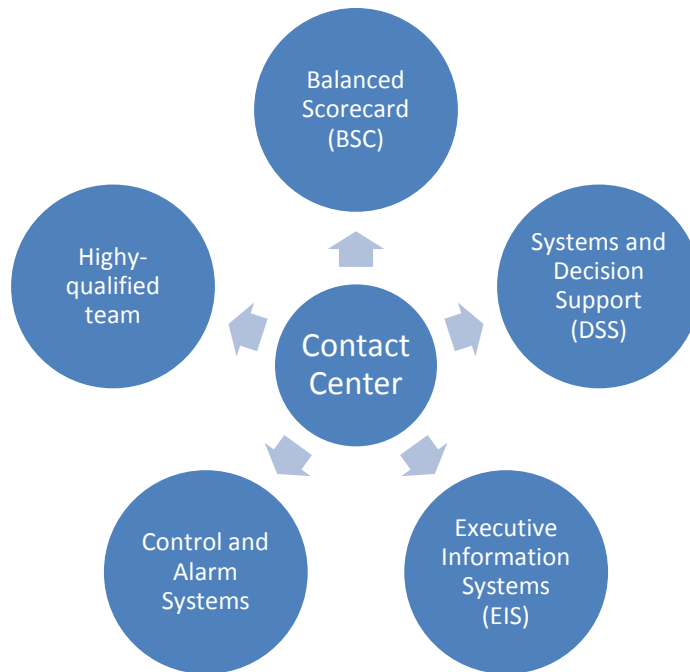**Never the less the main body at the front of a control center is a contact center**

Figure 1: Smart City Elements

4. THE ROLE OF A CALL CENTER

The call centers (or contact centers) are facing a challenging environment as they are stuck in the war between past trend and emerging trend [6]. Businesses are struggling to cater the increased demands through the new and costly technology. The traditional premises-based solution increases the cost for any business in terms of capital & operational cost, time and expertise. Hence the enterprises are moving towards deployment of new technology based call centers to maintain their core competencies and budget.

Traditional call centers were primary premises-based call centers; which catered limited customers (or potential customers) and responded to customer queries about specific info, lodging their complaints etc. Further a single customer was entertained at a time while they had no queuing mechanism established [4]. Most enterprises developed in-house call centers without realizing their additional cost and complexity. Hence the results attained through in-house call centers were quite poor.

Now in this competitive era, new technology based call centers (or modern call centers) have full-fledged in esteemed reputation as they have proved their value in a number of vital ways from delivery of product to customer's home, pre sales to after sales technical support etc. Modern call centers utilize modern era of computer-telephony integration, worldwide networks for global linkage of customer, data, and agents. Many CEOs and CTOs of mid-sized enterprises that seek to merge the traditional premises-based approach with modern rich featured call centers resist coping with high costs and discouraging technical challenges. While now many CEOs believe that hosted call centers are a better and viable solution for their business. The hosted or remote solution provides enterprises to enhance investments in existing infrastructure while confiding capital expenses required in deployment of new customer contact features. It recognizes the need that new call centers should support multi-channel integration, reduced technical complexities, faster service and high-speed networks, and benefit of computer-telephony integration (CTI).

This paper also gives a glance at comparison between traditional, current and future approaches used in call centers. In future, 'contact center as a service' would use the technologies like cloud computing. These technologies are more helpful for smart cities as there is no initial setup cost is required.

5. TDM BASED TRADITIONAL CALL CENTER

The traditional call centers were equipped with TMD (Time-Division Multiplexing) based technology having circuit connections. These connections were used to attach one or more remote providers and to connect an incumbent LEC (Local Exchange Carrier) when local DID (Direct Inward Dialling) services were required. As due to dedicated nature of circuits in a given TDM carrier, major situations created the demand to set up T1 circuits for each connection to provide connectivity different carrier providers in order to meet the demand of services like inbound DID, inbound 0800 (Toll Free Number), long distance outbound and local outbound etc. [3], [6]

Figure 2: TDM based Traditional Call Center

Moreover these T1 circuits were made by nature hard-wire connected with TDM carriers switch at either ends. The outcome was a static network hierarchy confined with lots of limitations possessing serious issues such as single points of failure etc. These circuits did not had any integration of customer information data base, concept of queuing setup and IVR (Interactive Voice Response) and internet connectivity, as shown in Figure 2.

Exploring further its limitations, traditional call centers is limited to use services in a specific region around its location because it is associated with PSTN (Public Switched Telephone Network) rate center. PSTN rate center reduces its connectivity with other region due to costly point-to-point leased circuits. Hence there is no flexibility to make it functional in any other geographic rate center.

6. VOIP BASED CALL CENTER

Unlike TDM, VoIP (Voice over Internet Protocol) and SIP (Session Initiation Protocol) based Trunking eliminates geographical limitation and allows DID services connect to call center; and hence transfers them to a desired traditional TDM based PSTN rate center. It also decimates circuit restriction as a call takes place through that rate center and passes into the IP network (Internet Protocol). [6]

In this way the call can be carried into any signaling terminal point on respective IP network, irrespective of its location, hence geographical price penalties and routing restrictions are applied are avoided. The call in the IP network attains Global Number Portability (GNP) as the geographical restrictions are removed.

In the case of VoIP call center, a call initiated from call center A will come in the IP domain through SIP. The call is then routed to organization's owned router, which routes and forwards call (outbound call) across their network and terminates it to the destination of a client.

Figure 3: VoIP based Contact Center

Call centers can freely deploy multiple DID services across different geographic rate centers with the help of VoIP technology. Therefore physical deployment is not required in any geographical globally. This was a major breakthrough in the field of ICT (Information and Communication Technology) to eliminate geographical ties and reduces connectivity charges. It was the key influence for enterprises to spur migration away from traditional networks to packet networks for voice call communications.

In TDM based traditional call center, resources are consumed whether they are operational or idle. Hence the enterprises had to pay charges for any unused bandwidth also. While in VoIP, there are charges for physical circuits and connections and further it only charges the enterprise on the bases of monthly bandwidth usage. This means that if the call volume traffic was high in a specific month then the charges would be also high as compared to other months. Likewise for some small enterprises having less monthly call traffic the charges are less as they required usage of less bandwidth. Therefore VoIP not only eliminate geographical limitations, it also removes charges for idle connection.

7. HOSTED CALL CENTER

Hosted call centers are a type of call centers in which the setup is not established on-premise but rather it is hosted to some other third party vender, who specializes in call center technology and have already deployed its infrastructure [7]. This type of solutions enable companies to save millions of dollars as they do not have to invest capital in the foundation of a call center but rather to use third party's or hosted network to run their business. Hosted call centers exist before the entrance of marketable Internet. Many call center vendors presented hosted solutions of their TDM-based network having IVRs located within PSTN network. After the advent of IP-based technology like VoIP communication, frame relay, commercial internet, storage medium and MPLS routing etc., hosted solutions become more simple and cheap.

During the global recession period between 2008 & 2009 and in 2011, small and medium sized enterprises started to find out rooms to hold their investment. Numerous hosted organizations were not able to provide an adequate level of customer experience required by the companies. Further some hosted vendors had to pull out of the market to high operational costs. As the demand for adding more functionality and flexibility in call center architecture was increasing along with the growth of customers, business community began to scrutinize hosted contact centers and started to move away from on-premise model.

There was a significant growth in hosted contact center and as per DMG Consulting; this market has grown up to 20% in 2012 and 18% in first quarter of 2013. It is estimated by Frost and Sullivan that North American hosted call center market will grow up to $1.5 billion by the end of 2015. [9]

8. CLOUD BASED CALL CENTER

The word 'cloud' basically derived from the network diagram used to show the internet [5]. By technology it means to use computing technology as a service, instead of as a product, available through shared pond of resources over the internet. In term of call center, cloud technology provides range of open sourced business applications, communication technologies to be available as a utility framework.

Cloud based call center basically comprises of three main components that are services, shared, and over a network. Service – Instead of investing huge capital investment, an enterprise only pays for on-going service fee depending upon agreed billing cycle (either by hour, per day or per month). This not only saves capital expenditure but also enables business to either scale up or scale down based on their respective business needs. Shared – Instead of locating the business on a particular location, business vendors can grow their base globally without any deployment of infrastructure on multiple locations as computing becomes a shared pond of available resources. Over a network – Through the use of hosting centers it provides secure virtual connections with 99.999% availability and elastic network approach. Hence internet connectivity provides cost-effective solutions to the services of a call center.
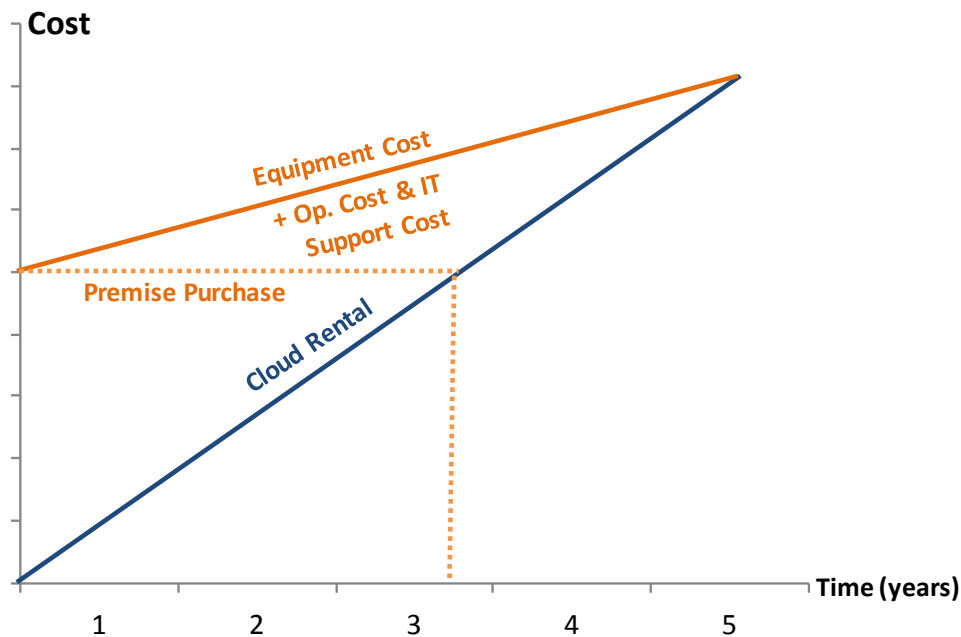

Figure 4: Cloud vs On-Premises Cost Analysis

Advantages [4], [8]:

- Upfront Cost: Cloud based call centers do not require any upfront costs. It's purely subscription based service depending on factors such as bandwidth size, number of agents, number of softwares used.

- Hidden Cost: No hidden or extra charges are involved. User pays as per usage of services in a specific month.

- On-demand Deployment: Cloud based services and applications such as open CRM (Customer Services Management), Cisco based IVR, CDN (Content Delivery Network), ACD (Automatic Call Distributor) etc. are all on-demand services and can be installed quickly without having any hardware cost.

- Scalability / Elasticity: Leading cloud providers such as Amazon EC2 and Rackspace etc. offers PaaS (Platform as a Service). PaaS offers companies to easily scale-up their infrastructure if their call volume traffic increased. It can be changed from hour-to-hour, day-to-day or monthly-to-monthly basis.

- Support for At-Home Agents: Due to easy PaaS and on demand solution, agents can sign in and work from their homes without the need for specific hardware. They only need a PC connected with high speed internet connectivity.

- Support for Multi-Apps: Being the nature of PaaS, agent can access multiple business apps simultaneously under the hood of a single panel.

- Maintenance: No maintenance charges will be charged by the company. Hosted cloud providers are responsible for all maintenance and upgrades.

- Availability: Most well-known cloud providers offer 99.999% availability, hence now the companies have to only focus on their core competencies rather than non-availability.

- Security: It provides high level of security than traditional and hosted-based contact centers. It offers services like physical security (as not everybody knows where the physical data centers are located), strong firewall, backup with frequency of 30min, 1hr, 4hr, 12hr, etc, 24/7 network monitoring through cloud engineers etc.

9. CONCLUSION

In the most battling era of competition, companies want to grow their business and to reach every individual customer with the use of latest cost-effective technologies and infrastructures. The first TDM based call center was established with dedicated circuit connections having PSTN infrastructure only. It required companies to invest huge capital investment, accommodate expensive inter connection charges and possess geographical limitations. Then with emergence of IP based call centers, the geographical limitations were eliminated and the companies were

able to reach customers easily. During the past years era of recession companies were still looking for a cost cutting solution such as hosted call center, where the data center was owned and located at a third party vendor. This hosted solution saved on-premises cost to companies further operational cost were also saved as they were also born by vendors. Due to increased operational cost many vendors stop their hosted solutions; this created a demand for a hosted solution but with direct involvement of the owner company not the vendor. As a result cloud based call concept was established in which companies can host their call center in a cloud provider with managed services. It requires no front up cost, no operational cost, no maintenance cost, no special hardware requirement etc. It also gives flexible architecture having elastic nature, such it can easily scale up if the call traffic demand is high. Companies only have to pay their usage of bandwidth (or the use of services per month) only. It also offers a great availability and security through strong physical security & firewall and further provides 24/7 monitoring.

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