Call Center Technologies
Latest Trends

Ministry of Information Technology
Government of Pakistan

August 2005

Contents

Introduction 3
1. The Six Essential Technologies for Workforce Optimization in Call Centers 4
2. Emerging Technologies for Call Centers and their Level of Maturity 8
3. Comparison of Call Center Solutions 13

Introduction

In the last few years, there has been a major boom in the call center industry in Pakistan. This includes both domestic and international call centers. So far there are approximately 80 international call centers and more than 30 domestic call centers employing more than 3000 agents. Majority of these call centers have operations in major cities such as Karachi, Lahore and Islamabad.

This compilation comprises of three articles which delve into the latest trends in Call Center technologies. The articles include excerpts from Gartner Research.

1. The Six Essential Technologies for Workforce Optimization in Call Centers (includes excerpts from Gartner Research)

Workforce Optimization (WFO) tools can help call centers to increase service levels, decrease payroll costs and decrease call abandon rates. The six essential technologies for Workforce Optimization are discussed here.

Interaction Recording

For decades, traditional call recording systems have been used to capture and store phone-based interactions within a huge variety of environments ranging from public safety services to insurance claims departments. These solutions have evolved to embrace voice and data recording, as in e-mail, Web chat and Voice over IP (VoIP), as well as agent screen activity like keystrokes, mouse activity and screen image. Multichannel recording can either be full time or selective, initiated by triggers ranging from customer identification like Dialed Number Identification Services (DNIS), agent or supervisor activation, and screen activity. However, the trend toward selective recording, which was often fueled by the high cost of data storage, is switching to mass recording of calls because of advances in data compression, which has significantly reduced storage costs and the ability to mine this data for insight.

Business benefits

Recording systems are often essential for business liability tracking, but tangible benefits can be achieved when deployed with a quality management solution.

Vendors

There are many specialist vendors in this market. Leading vendors include Nice Systems, Verint Systems, etalk, Dictaphone and Witness Systems.

Quality Management

These systems help assess and improve agent performance by retrieving agent call data and evaluating it against key metrics like politeness and professionalism via an online evaluation form. Once assessed, agents can be ranked, provided with feedback and even recommended for additional training, if necessary. Other capabilities include assessing agent activity in real time by listening into calls. This allows supervisors to provide the agent with tips or advice via Instant Messaging, and to take over the call if necessary. Recent advances include the use of speech analytics to mine recorded call data for keywords, the ability to assess call flow, and the use of emotion detection.

Business benefits

QM systems offer benefits for customers, employees and contact center managers. Key benefits include improved efficiency, effectiveness, customer satisfaction and revenue generation.

Vendors

Leading vendors in this market include Nice Systems, Witness Systems, Verint, etalk, Envision, Dictaphone, Mercom and ASC.

IVR Surveying

Interactive Voice Response (IVR) surveying is an underrated element of a WFO solution. It bridges the gap between traditional evaluation metrics for agents and the customer's actual experience. These tools are often deployed companywide and through multiple channels as part of a strategic, Customer Feedback System (CFS), which is used to provide insight into customer satisfaction and an understanding of customer behavior. However, IVR surveying has an important role to play within a WFO solution.

There are various modes of operation. For example, "agent initiated," where the agent asks if the customer would mind completing a survey following their call, and "system initiated," where an IVR is used before the agent is engaged, to ask the caller if they mind completing a survey after the call. Customer surveys align agent quality scoring (both the metrics evaluated and scores given) with real customer perceptions. Not all systems support the association of the agent with the specific survey, as the link is lost during the transfer to the survey site.

IVR survey systems support the creation of surveys using simple graphical user interfaces, the execution of surveys with support for triggers such as DNIS and alarms based on customer responses, and reporting features based on criteria such as agent, team or area code.

Business benefits

These systems help enhance the evaluation of agent performances, which will improve the efficiency and effectiveness of the contact center. In addition, they provide timely and important information on customer satisfaction, directly from customers, and form an integral part of a Customer Experience Management (CEM) solution.

Vendors

Key vendors include Customer Relationship Metrics, etalk, Nice Systems and Verint.

E-Learning

These solutions help optimize agent performance through the delivery of appropriate learning programs from basic content to detailed courses and examinations.

Online courses can be delivered directly to the agent's desktop at specific times. Courses are designed through easy-to-use development tools that support content imported from disparate sources, as well as creating exams and course evaluations for agent feedback. Most support content that complies with a Shareable Content Object Reference Model (SCORM). Some suppliers also have the ability to quickly create content from recorded calls. Integration with WFM and QM systems is essential for optimal course scheduling, agent needs identification and the ability to leverage good interactions for learning content. For training purposes, simulation tools replicate the realities of an agent call environment before new employees are subjected to real customers. Simulation-based content has provided the quickest time to competency and the highest return on investment for e-learning deployments in contact centers.

Business benefits

Optimizing agent performance through tailored learning programs helps increase customer satisfaction, loyalty and profitability. Additional benefits include increasing agent retention, shortening new agent training/ramp up time and improving agent cross-sell and upsell skills. For inbound and outbound centers, increased knowledge of agents through high-quality e-learning programs is cited as the biggest factor in increasing revenue.

Vendors

Leading vendors in the contact center e-learning market include Knowlagent, OutStart and SumTotal Systems. Most QM vendors also offer integrated agent coaching and e-learning solutions. Sivox Technologies offers simulation authoring capabilities, and Strategic Management Group provides simulation products and services.

Workforce Management

These tools use complex algorithms to optimize the scheduling of contact center agents, and historical and event-driven data to forecast the demand for agents. Support for task-based scheduling allows agents to be assigned to specific tasks, such as e-mail handling only, during times of low call volume.

Recent software advancements enable a balance to be struck between agent preferences and resource optimization as organizations begin to realize the benefits of having a happy workforce. Via their own interfaces, agents can enter preferences for future scheduling purposes and even engage in automated shift changes with colleagues. The balance between agent preference and resource optimization is controlled by the supervisor, who also has the ability to monitor agent adherence to tasks and to receive alerts to warn of serious irregularities in adherence.

Business benefits

WFM solutions significantly reduce the time it takes to create agent schedules. They increase service levels and reduce payroll costs and call abandon rates.

Vendors

Leading vendors in this market include Aspect Communications, Witness, IEX and Genesys. Others include CenterForce Technologies, Expert Solutions International, GMT, InVision Software, ISC Consultants, Pipkins, Q-Max Systems and Symon Communications.

Contact Center Performance Management

These systems integrate a company's contact center technologies, Customer Relationship Management (CRM) systems, and other data sources to provide a transparent picture of performance across sites, functions and levels, while aligning targets with business objectives. These solutions use analytical tools, primarily driven by Online Analytical Processing (OLAP) to filter, drill, graph and analyze key performance indicators to determine the root cause of good or bad performance and make real-time adjustments, if needed.

Business benefits

Benefits include an improvement in the average time it takes to handle calls, increased quality scores, reduced staff attrition and absenteeism, better productivity, more sales and fewer administration costs. However, the real value comes from the business insights that users glean from the system when aligned with corporate objectives.

Vendors

Leading specialist vendors include AIM Software, Merced Systems, Perfomix Technologies and Opus Group. But many other vendors are embracing contact center performance management. These include Nice and Witness Systems in QM, Siebel Systems in CRM and Hyperion Solutions from the Corporate Performance Management (CPM) arena. Other notable suppliers include Finali (now part of Convergys) and Voxify for consulting services and virtual agent technologies.

As a subset of CPM, traditional business intelligence vendors, such as Hyperion, SAS and Cognos are moving into this area via CRM analytics, and, eventually, via contact center analytics and performance management.

2. Emerging Technologies for Call Centers and their Level of Maturity

(includes excerpts from Gartner Research)

Advances in contact center infrastructure are focusing on integrating more broadly with enterprise functions and increasing contact channel interoperation. Following is a list of emerging technologies for contact / call centers and their level of maturity.

Web Call Through

Web call through enables both the voice call (via Voice over IP [VoIP]) and the Web contact session to be conducted simultaneously through the desktop system and Web browser.

Maturity Level: Embryonic.

Speech Analytics

Speech analytics reviews stored speech and live speech with speech engines to assist in contact management and operations.

Maturity Level: Embryonic.

Wireless Devices in Contact Centers

Wireless devices and interfaces (other than speech on mobile phones) enable client contact interaction.

The use of Short Message Service will drive demand for more advanced wireless devices.

Maturity Level: Emerging.

Presence-Based Contact Routing

Presence-based contact routing encompasses a model and database of individual availability and preferences that drive contacts.

Consumer use will lag, but business-to-business, back-office and high-interaction contact center applications will adopt presence-based contact routing.

Maturity Level: Emerging.

Instant Messaging

Instant Messaging (IM) technology enables contact center agents to interact with clients, users or supervisors.

IM best practices do not exist, and IM may result in high operational and management costs. This technology may meet resistance by many customer segments due to privacy and security concerns.

Maturity Level: Emerging.

Unified Communications

Unified communications integrates communications, including live voice and messaging channels, not only with contact center processes and agents, but also with business processes and individuals across the enterprise.

Unified communications requires a broad set of technologies and changes to business processes, which will delay wide-scale adoption.

Maturity Level: Emerging.

IP-Telephony-Based Contact Centers

These contact centers use VoIP and IP telephony to support agents and callers.

This type of contact center requires the wide-scale adoption of IP telephony across the enterprise.

Maturity Level: Emerging.

Contact Centers

In addition to telephony, contact centers support one or more communication channels, such as e-mail, text chat, Web or wireless text.

Many channels are being supported by contact centers, but it is challenging to integrate infrastructure with universal queuing and new business processes.

Maturity Level: Emerging.

Web Collaboration

Web collaboration uses Web technology for live interaction between call center agents and customers or users. It can include co-browsing and Web page steering.

Web collaboration is based on well-known technology. However, it requires adoption by consumers before it can be justified as an enterprise investment.

Maturity Level: Adolescent.

SIP

Session Initiation Protocol (SIP) is a text-based protocol for initiating and managing communication sessions.

SIP standards and applications are still evolving.

Maturity Level: Adolescent.

Universal Queue Management

Universal queue management enables the integration of contact center channel queuing, routing, reporting and management, including channels such as voice calls, e-mail, text chat and Web collaboration.

Enterprises' interest in universal queue management is increasing because of their desire to consolidate infrastructure and offer more consistent service to customers. However, this technology's use and management is not well understood, and channel integration is technically difficult.

Maturity Level: Adolescent.

Text Chat

Text chat enables customers to interact with contact center agents via Web browser text windows.

Text chat is limited to certain applications, such as when a customer uses a dial-up modem and does not have a separate phone line on which to communicate while online.

Maturity Level: Adolescent.

VoiceXML

VoiceXML is an Extensible Markup Language (XML) Web-based protocol used by telephony and speech recognition voice-processing systems and applications.

VoiceXML is at release level 2 and has significant support from a broad range of vendors on their products. It has been available for several years, and many companies and service providers have developed applications. VoiceXML creates greater flexibility to build capabilities, enabling companies to consider new ways of sourcing solutions.

Maturity Level: Adolescent.

Speech Recognition in Contact Center Applications

Speech recognition technology is used for contact center applications such as call routing, commands for navigation, data entry and transactional self-service functions.

Improvements in recognition rates, design tools and standards are driving the adoption of speech recognition technologies.

Maturity Level: Early Mainstream.

Bundled Contact Center Suites

Bundled contact center suites integrate automatic call distribution, universal queuing, computer-telephone integration, interactive voice response and Internet contact channels into a software server.

Reliability and scaling issues for bundled contact center suites largely have been resolved.

Maturity Level: Early Mainstream.

Virtual Contact Centers

Virtual contact centers allow multiple physical locations to operate as a logical center. Calls and other contacts are routed independent of physical location.

Virtual contact center use is spreading beyond very large centers into midsize operations. This technology can help integrate offshore centers.

Maturity Level: Early Mainstream.

E-Mail Response Management Systems

E-mail response management systems help handle and process e-mail interactions.

These systems are well understood, but they are not as widely deployed as they should be. They often are not well integrated with other contact center channels and business applications.

Maturity Level: Early Mainstream.

VoIP Toll Bypass

VoIP toll bypass uses TCP/IP data communication carriers to transport voice conversations between locations, thus avoiding standard telephone tariffs.

VoIP toll bypass is useful in some situations, such as when call centers in two countries must frequently exchange voice calls. The standard phone tariff between these countries is high, but by using toll bypass, this tariff is avoided because the voice traffic travels over a nontariffed data link. VoIP toll bypass is not a stepping stone to IP contact centers, however.

Maturity Level: Early Mainstream.

Customer Experience Management Applications

Customer experience management applications enable contact centers to better monitor and manage the overall customer experience. Key technologies include quality assurance, workforce management, recording, data analytics and agent training/e-learning.

These applications have been widely adopted by leading centers, but they have seen limited use and adoption in others.

Maturity Level: Early Mainstream.

Call Centers

Call centers incorporate a set of technologies that support high volumes of phone calls. Key underlying technologies include automatic call distribution, computer-telephone integration and interactive voice response.

This is a mature technology.

Maturity Level: Early Mainstream.

Appendix A. Maturity Level Definitions

Embryonic: In labs.

Emerging: Commercialization by vendors. Pilots and deployments by industry leaders.

Adolescent: Maturing technology capabilities and process understanding. Uptake beyond early adopters.

Early mainstream: Proven technology. Vendors, technology and adoption rapidly evolving.

3. Comparison of Call Center Solutions (includes excerpts from Gartner Research)

	Advoco Software AB	Alcatel	AltiGen Communications, Inc.
	Advoco NetPBX Contact Center Solution	**OmniTouch (OT) Embedded Voice-OmniGenesys (OG) Multi-Chnl CTI Server Based**	**AltiContact Manager (ACM)**
System Configuration	Stand-alone, server-based software solution	OmniTouch (implemented as server-based software on Alcatel OmniPCX Enterprise), OmniGenesys (server-based)	Software module integrated with AltiServ PBXs. ACD, real-time reporting and agent and supervisor software
Operating System(s) Supported	Windows 2000, Windows XP, Windows 2003 Server	OmniTouch OmniPCX Enterprise (Linux or Unix), OmniGenesys (server based - NT or Unix)	Windows Server 2003
Max. Number of Digital Trunks Supported	160 (E1 or T1)	2,000	192 (T1), 240 (E1)
Max. Number of IP Trunks Supported	320	2,000	120
Max. Number of Active Agents Supported	10,000 per server	1,000	144 (per server)
Max. Number of Supervisor Positions Supported	1,000 per server	OmniTouch (60), OmniGenesys (200 logged in)	99
Busy Hour Call Completions (Peak--one hour)	100,000	150,000	14,400
Interactive Voice Response (IVR) Support	Optional (Advoco, Envox or Intel/Parity)	Optional (OmniTouch CCivr) OmniGenesys Voice Portal (GVP)	Standard (255 separate IVR and Auto-Attendant menus included)
Max. Number of Skills Groups	No software limitations (systems tested for 1,000 per server)	1,000 (OmniTouch, no software limitations -- OmniGenesys)	64 distinct workgroups
CRM Interface Support	Standard	Optional using OmniGenesys (Remedy, Pivotal, Siebel, Vantive)	Standard (ACT, Outlook, Goldmine now includes out-of-the box .NET integration with Microsoft CRM)
IP Support	Standard	Standard	Standard
Voice Recording/Logging Support	Standard	Optional	Standard (voice record to voice mail and centralized server-based voice)
Agent Monitoring	Standard	Standard	Standard
Real-Time Display of Call/Agent Statistics	Standard	Standard (OmniTouch and OmniGenesys)	Standard (AltiGen AltiAgent, AltiSupervisor), optional (Advanced AltiReport - allows administrators to generate advanced call center reports for ACC/ACM 5.0A)
SNMP Support	Standard	Optional (SNMP agent)	Not available
Price per Agent/Station (US$)	1,400 per seat (complete basic configuration with 100 seats, e-mail and CT functionality)	500 (OmniTouch) to 1,200 (OmniGenesys Express)*	550 to 850 (not including phones)*

	AltiGen Communications, Inc.	Altitude Software	Amcat
	AltiServ Contact Center (ACC)	**Altitude uCI 7**	**Amcat Contact Center Suite**
System Configuration	Software module integrated with AltiServ PBXs. ACD, Real-time reporting and agent and supervisor software	Open, stand-alone, software server (Wintel, AIX, Linux, Solaris) or with PBX, single-site, multi-site, Virtual Call Center. All-in-one CC suite.	Stand-alone, server-based software solution
Operating System(s) Supported	Windows 2000 Server, NT Workstation	Linux, Windows 2003/2000, NT Server, IBM AIX, Sun Solaris, Windows XP, Citrix metaframe	Windows NT, Windows 2000 and 2003 Server
Max. Number of Digital Trunks Supported	192 (T1), 240 (E1)	Maximum limits dependent on PBX capabilities	3,840 (per physical cabinet - cabinets can be linked together to form single system)
Max. Number of IP Trunks Supported	120	Maximum limits dependent on PBX capabilities	3,840 (per physical cabinet - cabinets can be linked together to form single system)
Max. Number of Active Agents Supported	128 (per server)	No software limitations (800 agents tested)	3,840 (per physical cabinet - cabinets can be linked together to form single system)
Max. Number of Supervisor Positions Supported	99	No software limitations	100
Busy Hour Call Completions (Peak--one hour)	14,400	40,000	3,840 per system
Interactive Voice Response (IVR) Support	Standard (255 separate IVR and Auto-Attendant menus included)	Optional (Altitude IVR-speech enabled) standard (DTMF/touch-tone)	Optional (speech enabled), standard (DTMF/touch-tone)
Max. Number of Skills Groups	32 distinct workgroups	No software limitations (1,000 tested)	Three skill levels plus language skills, for each agent definition, are provided. Additional skills are programmable.
CRM Interface Support	Standard (ACT, Outlook, Goldmine now includes out-of-the box .NET integration with Microsoft CRM)	Optional (out-of-the-box with Siebel 7, MySAP CRM and project-based Microsoft CRM, Goldmine, Clarify)	Optional
IP Support	Standard	Standard	Optional (3,840 simultaneous IP calls), SIP Softphone
Voice Recording/Logging Support	Standard (voice record to voice mail and centralized server-based voice)	Optional	Optional
Agent Monitoring	Standard	Standard (switch-dependent)	Standard
Real-Time Display of Call/Agent Statistics	Standard (AltiGen AltiAgent, AltiSupervisor), optional (Advanced AltiReport)	Standard	Standard
SNMP Support	Not available	Supported through customization	Not available
Price per Agent/Station (US$)	200 to 365 (not including phones)*	Per seat (concurrent use, not named agent), starts at 500 (voice), 1,300 (scripted screens) and up to 2,900 including Predictive Dialer	2,000 (base) per agent

	Apropos Technology	Aspect Communications Corp.	Aspect Communications Corp.
	Apropos Interaction Management Suite v6.5 - Enterprise Edition	**Aspect Call Center ACD**	**Aspect Enterprise Contact Server**
System Configuration	PBX integrated software solution supports Windows 2000 and Windows 2003	Stand-alone (located on NT Server) or networked with other Aspect Call Centers or non-Aspect Call Centers through Aspect Enterprise Contact Server	Software solution located on Windows 2000 servers
Operating System(s) Supported	Server - Windows 2000 and 2003, client - Windows 2000 and Windows XP	Microsoft Windows NT	Windows 2000 Server and Advanced Server
Max. Number of Digital Trunks Supported	3,000	3,000 (assuming no other port types are used)	ACD/PBX dependent
Max. Number of IP Trunks Supported	3,000 (no software limitations)	3,000 (assuming no other port types are used)	ACD/PBX dependent
Max. Number of Active Agents Supported	10,000 (multimedia agents per single system)	1,488	1,500
Max. Number of Supervisor Positions Supported	1,000 supervisors may be active simultaneously (no hard-coded limit to the number of configured supervisors)	7,500	Defining a supervisor includes defining a skill within the skills database
Busy Hour Call Completions (Peak--one hour)	379,974 voice interactions per busy hour	200,000	200,000
Interactive Voice Response (IVR) Support	Standard (DTMF), optional (speech enabled)	Standard (basic IVR), optional (advanced IVR via Aspect CSS and other vendors)	Standard (out-of-the-box integration to Aspect CSS and other IVR vendors)
Max. Number of Skills Groups	Maximum range installed by client (1 - 100)	992	Skills are the same as groups in the Aspect Enterprise Contact Server
CRM Interface Support	Standard (Siebel, Kana, SAP, Onyx, Remedy, Peregrine Oracle (includes PeopleSoft and JD Edwards)	Optional (Aspect Enterprise Contact Server, out-of-the-box front-office adapters and customizable APIs)	Optional (out-of-the-box front-office adapters and customizable APIs to other CRM solutions)
IP Support	Standard (native support for Cisco, Mitel & 3Com via TAPI/WAV integration)	Optional (via Aspect Uniphi Connect IP card)	Optional (via Aspect Uniphi Connect IP card)
Voice Recording/Logging Support	Optional (via Quality Experience Manager or integration with third-party applications such as Nice, Witness, etc.)	Optional (agent-monitoring card)	Optional (agent-monitoring card)
Agent Monitoring	Standard	Standard	Standard (Aspect Call Center)
Real-Time Display of Call/Agent Statistics	Standard	Standard	Standard
SNMP Support	Standard	Optional (HP OpenView, Tivoli, CA Unicenter)	Optional (can be provided through integration with the Windows Event Viewer)
Price per Agent/Station (US$)	1,600 - 3,000 per seat (depending upon interaction types and configurations)	1,500 per agent (starting price)	6,000 per agent (with support for all channels, IVR, analysis/reporting and workforce management)

	Aspect Communications Corp.	Aspect Communications Corp.	Avaya, Inc.
	Aspect Iphinity Call Center	**Uniphi Suite 2004**	**Avaya Compact Contact Center for IP Office**
System Configuration	Stand-alone (located on NT Server) or networked with Aspect Call Center or non-Aspect solutions via Aspect Enterprise Contact Server	Software solution located on Windows 2000 servers	All-in-one server-based, IP telephony, network, Internet solution for SME
Operating System(s) Supported	Microsoft Windows NT	Windows 2000 Server and Advanced Server	Windows NT, 2000/2003, XP
Max. Number of Digital Trunks Supported	640	ACD/PBX dependent	120
Max. Number of IP Trunks Supported	640	ACD/PBX dependent	120
Max. Number of Active Agents Supported	48-agent package, 96-agent package	250	75
Max. Number of Supervisor Positions Supported	7,500	Defining a supervisor includes defining a skill within the skills database	21
Busy Hour Call Completions (Peak--one hour)	200,000	16,000	36,000
Interactive Voice Response (IVR) Support	Standard (out-of-the-box integration to Aspect CSS and other IVR vendors)	Optional (Uniphi Voice Portal, Aspect CSS and other IVR vendors)	Optional (Voice Mail Pro), Microsoft ActiveX Data Objects integration
Max. Number of Skills Groups	992	Supports 200 skill parameters, but unlimited number of skill groups	No software limitations
CRM Interface Support	Optional (Aspect Enterprise Contact Server, out-of-the-box front-office adapters and customizable APIs)	Optional (customizable APIs to other CRM solutions)	Optional (Microsoft CRM integration)
IP Support	Optional (via Aspect Uniphi Connect IP card)	Standard	Standard
Voice Recording/Logging Support	Optional (agent-monitoring card)	Optional (agent-monitoring card)	Optional
Agent Monitoring	Standard	Standard (on Aspect ACD, Cisco CallManager does not support)	Standard
Real-Time Display of Call/Agent Statistics	Standard	Standard (Real-time data is captured and stored), Optional (for customized real-time reports & display of real-time statistics requires purchase of Viewpoint server and user licenses)	Standard
SNMP Support	Optional (HP OpenView, Tivoli, CA Unicenter)	Optional (can be provided through integration with the Windows Event Viewer)	Optional
Price per Agent/Station (US$)	199,000 for 48-agent package, 299,000 for 96-agent package*	1,000 per agent for basic routing, 1,500 per agent for Advanced Routing	500 per agent (starting price)

	Avaya, Inc.	Avaya, Inc.	Cisco Systems, Inc.
	Avaya Customer Interaction Suite	**Contact Center Express 2.1**	**Cisco IPCC Enterprise Edition**
System Configuration	Co-resident call center software or software-based platform	Server-based software	Server-based software
Operating System(s) Supported	Linux, Microsoft Windows 2000/2003, Sun Solaris, IBM AIX, IBM WebSphere (Avaya Unix on traditional systems)	Microsoft Windows 2000 Server, Microsoft Windows 2003, Microsoft Windows XP	Windows 2000, Windows NT
Max. Number of Digital Trunks Supported	8,000 (with Avaya S8700 Media Server), switch dependent for non-Avaya systems	8,000 (with Avaya S8700 Media Server)	No software limitations (Cisco CallManager configuration dependent)
Max. Number of IP Trunks Supported	12,000 (with Avaya S8700 Media Server), switch dependent for non-Avaya systems	12,000 (with Avaya S8700 Media Server)	No software limitations (Cisco CallManager configuration dependent)
Max. Number of Active Agents Supported	5,200 per system (with Avaya S8700 or S8710 Media Server)	50 to 150 agents is target market - greater numbers can be accommodated dependent on customer environment	2,000 agents per CallManager Cluster (multiple clusters can be combined for greater scalability)
Max. Number of Supervisor Positions Supported	400 (dependent on customer environment)	5 to 15 supervisors is target market - greater numbers can be accommodated dependent on customer environment	2,000 agents per CallManager Cluster (multiple clusters can be combined for greater scalability)
Busy Hour Call Completions (Peak--one hour)	300,000 (for S8700 or S8710 contact center applications -- BHCC dependent on customer environment and routing strategy)	300,000 (for S8700 or S8710 contact center applications -- BHCC dependent on customer environment and routing strategy)	CallManager platform dependent (MCS7835, 7845 -- 125,000 per server), MCS7815, MCS7825, ICS7750 -- 10,000 per server
Interactive Voice Response (IVR) Support	Optional (Avaya Interactive Response module or third-party IVR)	Optional (Avaya Interactive Response module)	Optional (Cisco Customer Voice Portal, Cisco IP-IVR, third-party TDM IVRs)
Max. Number of Skills Groups	2,000 (with Avaya S8700, S8710 or S8500 Media Server -- no software limitations/switch dependent)	2,000 (with Avaya S8700 or S8710 or S8500 Media Server -- no software limitations/switch dependent)	No software limitations (10,000 maximum installed)
CRM Interface Support	Optional (prewritten Customer Interaction Suite Adapters with partner CRM vendors: Siebel, PeopleSoft, SAP, Onyx, E.Piphany)	Optional (prewritten adapters with partner CRM vendors: MS-CRM)	Optional (Siebel, Peoplesoft, SAP, Oracle and other third-party vendors)
IP Support	Standard	Standard	Standard
Voice Recording/Logging Support	Optional (call recording and quality monitoring for IP through partnerships with NICE, Verint, and Witness).	Optional (through partnerships with NICE, Verint -- traditional digital trunk-side/ext. side recording).	Optional (Cisco Silent Monitor, Witness, eTalk, Nice Systems, and other third-party vendors)
Agent Monitoring	Standard	Standard	Optional
Real-Time Display of Call/Agent Statistics	Optional	Standard	Standard
SNMP Support	Standard	Not available	Optional
Price per Agent/Station (US$)	500 to 3,000 per agent (software only - depending on configuration and modules selected)	425 to 1,000 per agent depending on configuration and modules selected	1,100 per agent (starting price, 1 agent, intelligent call routing, skills-based routing, and CTI)

	Cisco Systems, Inc.	Computer Talk Technology (CTT), Inc.	Concerto Software
	Cisco IPCC Express Edition Standard, Enhanced and Premium	**ice[3]**	**Concerto Unified Edition (formerly EnsemblePro)**
System Configuration	Server-based software, standalone call center	Stand-alone, server-based software solution	Unified solution, stand-alone configuration
Operating System(s) Supported	Windows 2000, Windows Advanced Server	Windows NT, Windows 2000	Windows 2000 & 2003 Server, Windows 2000 & XP client
Max. Number of Digital Trunks Supported	No software limitations (Cisco CallManager configuration dependent)	600	2,592
Max. Number of IP Trunks Supported	No software limitations (Cisco CallManager configuration dependent)	400 (supported via Cisco CallManager)	2,592
Max. Number of Active Agents Supported	200	400	1,200
Max. Number of Supervisor Positions Supported	32	100	999 (configurable), 60 (active)
Busy Hour Call Completions (Peak--one hour)	9,000	20,000	60,000
Interactive Voice Response (IVR) Support	Standard (all versions - basic IVR support), optional (Premium - advanced IVR for self-service applications)	Standard (embedded iceVoice--VoiceXML & SALT)	Standard (with all configurations)
Max. Number of Skills Groups	100	No software limitations	999
CRM Interface Support	Optional (Enhanced and Premium with any Microsoft Windows compatible application)	Standard -- embedded iceCTI (ODBC, XLM, OLE, SQL, TCP/IP, SAP, Remedy, Onyx, FrontRange, others)	Optional
IP Support	Standard (all versions)	Standard	Standard
Voice Recording/Logging Support	Standardl (Enhanced and Premium only), optional (third-party vendors)	Optional	Standard (with all configurations)
Agent Monitoring	Optional (Enhanced and Premium Only)	Standard	Standard
Real-Time Display of Call/Agent Statistics	Standard (all versions)	Standard	Standard
SNMP Support	Standard (all versions)	Standard	Optional (third-party system)
Price per Agent/Station (US$)	595 - 1,495 per seat* (see comments)	1,400 per agent (starting price, 25 agents -- software only)*	1,500 (inbound telephony), 2,000 (outbound telephony), 3,000 (multimedia agent)*

	Concerto Software	CosmoCom	eOn Communications
	FirstPoint Enterprise	**CosmoCall Universe**	**eQueue Multi-Media Contact Center Solution**
System Configuration	Stand-alone configuration	Stand-alone all IP software platform, hostable by network service providers (NSPs)	Located on Linux server, multimedia contact center solution
Operating System(s) Supported	Windows 2003	Windows 2000, Windows XP, Windows 2000 Server, Windows 2000 Advanced Server, Windows 2003 Server, WIndows 2003 Advanced Server	Linux
Max. Number of Digital Trunks Supported	3,700 (per physical cabinet. Cabinets can be linked together to form single system)	240,000 (via standard gateways)	4,000
Max. Number of IP Trunks Supported	256 native (IP gateways can be used to convert TDM to IP)	240,000 (switchless all Ip architecture supports virtually unlimited scaling)	4,000
Max. Number of Active Agents Supported	2,400 (per physical cabinet. Cabinets can be linked together to form single system)	8,000 (per tenant limit), 120,000 systemwide limit	1,000 per system (multiple eQueue systems networked together allow greater scalability based on customer demand)
Max. Number of Supervisor Positions Supported	255 (active), 2,400 (configurable) per cabinet. Cabinets can be linked together to form single system.	No software limitations	1,000 - no practical limit
Busy Hour Call Completions (Peak--one hour)	117,000 per physical cabinet (cabinets can be linked together to form single system)	360,000 (per tenant limit, 100 call arrivals/sec), 2,880,000 (systemwide limit)	100,000
Interactive Voice Response (IVR) Support	Optional	Standard (DTMF), optional (ASR, also integrates with all third-party IVRs & ASRs via open API)	Optional (eQueue IVR)
Max. Number of Skills Groups	1,000	No software limitations	5,000
CRM Interface Support	Optional	Standard	Standard (CSTA, TSAPI, Genesys, SQL, ODBC, DDE, ActiveX, Javabeans TAPI, VERSIT, CT Connect and IBM CallPath)
IP Support	Optional	Standard	Optional (VoIP support available to the desktop for local and remote agents)
Voice Recording/Logging Support	Optional	Standard	Optional (eQueue Recording)
Agent Monitoring	Standard	Standard	Standard
Real-Time Display of Call/Agent Statistics	Standard	Standard	Optional (eQueue Supervisor Workspace provides real-time information for agent and gate statistics via a Java-based client)
SNMP Support	Standard	Standard	Standard
Price per Agent/Station (US$)	2,435 to 2,900 (list price)*	2,000 (single channel) to 5,000 (all channels)*	2,000 per agent (configuration dependent)

	Genesys Telecommunications Labs	Genesys Telecommunications Labs	Inter-Tel, Inc.
	Genesys Express	**Genesys Suite 7**	**Call Center Suite**
System Configuration	Turnkey, single-site contact center software solution	Open software-based, platform independent	Implemented as server-based software
Operating System(s) Supported	Windows 2000	Windows XP/NT/2000, Sun Solaris, HP-UX, IBM AIX, Digital Unix (Compaq Tru64 Unix)	Windows NT, Windows 2000, Windows 98, Windows XP
Max. Number of Digital Trunks Supported	No Genesys limit (switch dependent)	No Genesys limit (switch dependent)	896
Max. Number of IP Trunks Supported	No Genesys limit (switch dependent)	No Genesys limit (switch dependent)	896
Max. Number of Active Agents Supported	Designed for midmarket (5 to 150 seats)	50,000+ tested successfully, (switch dependent)	3,000
Max. Number of Supervisor Positions Supported	Designed for midmarket (5 to 150 seats)	No Genesys limit (switch dependent)	300
Busy Hour Call Completions (Peak--one hour)	14,400 (4 calls/sec)	Dependent on customer environment and routing strategy, but testing has exceeded 40 calls/sec (144,000 per hour)	33,500
Interactive Voice Response (IVR) Support	Standard	Optional (third-party IVRs [Aspect, Avaya, Edify, Envoy, IBM, Microsoft, Nortel Networks - Periphonics)	Optional
Max. Number of Skills Groups	No Genesys limit (switch dependent)	No Genesys limit (switch dependent)	5,000
CRM Interface Support	Optional (Genesys Contact Navigator or Gplus Adapters with partner CRM Vendors: Siebel, Peoplesoft, Microsoft, and SAP)	Optional (Genesys Contact Navigator or Gplus Adapters with partner CRM Vendors: Siebel, Peoplesoft, Microsoft, and SAP)	Optional
IP Support	Optional (Genesys Express, Enterprise, or Network IP Contact Centers)	Optional (Genesys Express, Enterprise, or Network IP Contact Centers)	Optional
Voice Recording/Logging Support	Optional (through partnerships with key vendors)	Optional (through partnerships with key vendors)	Optional
Agent Monitoring	Standard	Standard	Standard
Real-Time Display of Call/Agent Statistics	Standard	Standard	Optional
SNMP Support	Optional (Genesys provides MIB for integration with third-party SNMP applications)	Optional (Genesys provides MIB for integration with third-party SNMP applications)	Not available
Price per Agent/Station (US$)	500 per agent (Express CTI ScreenPop), 1,200 per agent (Express Voice), 1,600 per agent (Express Multimedia)	1,925 per agent (starting price with Genesys Customer Interaction Management and Inbound Voice)	140 per agent (50-agent configuration, software only)*

	Interactive Intelligence, Inc.	Microlog	Mitel Networks
	Customer Interaction Center (CIC)	**ServiceFirst Contact Management Solution 3.2.0**	**Mitel Networks 6100 Contact Center Solution**
System Configuration	VoIP (software only - Intel NetStructure Host Media Processing 1.1 or integrated to Cisco AVVID CallManager via TAPI). Hardware (VoIP using Audiocodes).	Stand-alone, server-based software solution, can work with or without PBXs and is Centrex-compatible	Implemented as server-based software
Operating System(s) Supported	Windows 2000, Windows 2003, Windows XP	Windows 2000	Windows 2000, Windows XP
Max. Number of Digital Trunks Supported	1,920	PBX-dependent (supports PBX functionality through in-band or CTI interface--96 lines per rack-mount PC)	1,320
Max. Number of IP Trunks Supported	2,400	IP configuration dependent (supports IP trunk through standard IP interfaces)	360 (with maximum of 6 gateways)
Max. Number of Active Agents Supported	1,500	1,000 per single CPU server (mult-CPU server capacity depends on the server scalability)	350 (with Mitel Networks SX-2000 Communications Platform)
Max. Number of Supervisor Positions Supported	400	Standard (1 for every 10 agents) optional (additional clients available as an option)	2,100
Busy Hour Call Completions (Peak--one hour)	231,000	Load-tested to 9,000 (voice calls). Have tested over 250,000 contacts per day with combined media types	14,449 (Mitel Networks 6100 Contact Center Solution), 43,346 (SX-2000 PBX)
Interactive Voice Response (IVR) Support	Standard (includes menu-driven auto attendant builder and graphical design tool)	Standard (ServiceFirst IVR), optional (third-party systems)	Optional (integration done via Professional Services)
Max. Number of Skills Groups	No limitation	No restriction on number of skill groups	255
CRM Interface Support	CIC integrates with any datasource via ODBC, TCP/IP, mainframe terminal emulation, IBM MQ Series middleware, XML and SOAP.	Standard (open architecture--supports Web-based applications, ActiveX, terminal emulation, XML, socket-based, Java and more)	Optional (integration done via Professional Services)
IP Support	Standard	Optional	Standard (with Mitel Networks 3300 ICP, SX-200 ICP)
Voice Recording/Logging Support	Standard	Optional (with IVR)	Optional (Mitel Networks 6300 Call Recording)
Agent Monitoring	Standard	Optional (silent monitoring depends on switch or IVR configuration)	Standard
Real-Time Display of Call/Agent Statistics	Standard	Standard	Standard
SNMP Support	Standard (HP OpenView, Tivoli, CA Unicenter, Microsoft Operations Manager [MOM])	Optional (SNMP is provided with IVR)	Standard (SNMP agent capability provided in PBX software)
Price per Agent/Station (US$)	2,000 to 4,000 per installed CIC call center seat	1,000 (voice/CTI only), 250 to 1,000 each (other media types)*	300 to 1,700 per agent (based on 100 agents-ACD only to e-mail routing enabled)

	NEC Unified Solutions, Inc.	Nortel Networks	Nortel Networks
	CCDesign	**Business Communication Manager Call Center (BCM CC)**	**Symposium Call Center Server**
System Configuration	Implemented as server-based software	Software keycode access on BCM, converged IPT platform, no additional hardware or software required	PBX integrated, Windows-based server
Operating System(s) Supported	Windows 2000 and 2003 Server	Embedded NT	Windows 2003 and Windows 2003 Advanced Server
Max. Number of Digital Trunks Supported	255 (Business), 1,500 (Enterprise)	72	4,400
Max. Number of IP Trunks Supported	255 (Business), 1,500 (Enterprise)	60	4,400
Max. Number of Active Agents Supported	120 (Business), 1,000 (Enteprise)	80	3,300 at any one site (99,000 in virtual contact center -- maximum 30 networked sites)
Max. Number of Supervisor Positions Supported	8 (Business), 160 (Enterprise)	80	Unlimited using browser
Busy Hour Call Completions (Peak--one hour)	Only Busy Hour Call Attemps (BHCA) data provided by vendor--8,000 (Business), 46,000 (Enterprise)	2,400	44,000
Interactive Voice Response (IVR) Support	Optional (NEC QueWorX)	Optional (BCM IVR keycode option -- no additional hardware required)	Optional (integrates with Nortel Media Processing Server [MPS 500] and VPS/is self-service systems, third-party IVR solutions)
Max. Number of Skills Groups	32	50	1,000 different skill sets
CRM Interface Support	Optional (Fusion Strategic Alliance Program)	Optional (all leading CRM application vendors)	Optional (works with third-party CRM applications including Siebel, Amdocs/Clarify, PeopleSoft, SAP and Oracle)
IP Support	Optional	Standard	Standard
Voice Recording/Logging Support	Optional (Fusion Strategic Alliance Program)	Optional (BCM Messaging or third-party systems)	Optional (using Nortel Networks Remote Agent Observe or other third-party applications)
Agent Monitoring	Standard	Standard	Standard
Real-Time Display of Call/Agent Statistics	Standard	Standard	Standard
SNMP Support	Not available	Standard	Standard (any product that can compile an MIB-management information base)
Price per Agent/Station (US$)	Based on features*	300 to 500 per seat (Basic or Professional version -- includes all BCM contact center software for 20 - 80 active agents)	550 to 1,200 per seat (software-solution 250-seat with skill-based routing and real-time/historical reporting)

	Nortel Networks	Siemens Communications, Inc.	Siemens Communications, Inc.
	Symposium Express Call Center	**Siemens HiPath ProCenter Advanced Suite**	**Siemens HiPath ProCenter Entry Suite**
System Configuration	PBX integrated, Windows 2000-based server	Implemented with software platform located on Windows Server	Implemented with software platform located on Windows Server
Operating System(s) Supported	Windows 2000	Windows 2000	Windows 2000
Max. Number of Digital Trunks Supported	750	5,760	120
Max. Number of IP Trunks Supported	3,000	5,760	48 (with 3-HG 1500, ISDN B channels)
Max. Number of Active Agents Supported	150	1,250 (per site)	64 (50 with optiset E display phones)
Max. Number of Supervisor Positions Supported	15	500	8
Busy Hour Call Completions (Peak--one hour)	5,000	8,000 (per site)	2,500 (per site)
Interactive Voice Response (IVR) Support	Optional (integrates with Nortel Media Processing Server [MPS 500] and VPS/is self-service systems, third-party IVR solutions)	Optional (HiPath ProCenter Prompt Response or Advanced Speech Recognition)	Not available
Max. Number of Skills Groups	100	100	12
CRM Interface Support	Optional (works with third-party CRM applications including Siebel, Amdocs/Clarify, PeopleSoft, SAP and Oracle)	Optional (CRM ready kits for Remedy, Siebel, SAP)	Optional (third-party applications)
IP Support	Standard (Nortel Networks Communication Server 1000/1000M or Meridian 1 IP-enabled, Remote Office 9150/9110/9115)	Optional (supported with Siemens HiPath 5000)	Optional (supported with Siemens AllServe 150)
Voice Recording/Logging Support	Optional (using Nortel Networks Remote Agent Observe or other third-party applications)	Optional (Siemens Xpressions or third-party applications)	Optional (Siemens Xpressions)
Agent Monitoring	Standard	Optional (Comverse Quality Management)	Standard
Real-Time Display of Call/Agent Statistics	Standard	Optional (HiPath ProCenter Supervisor & HiPath ProCenter Agent)	Standard (HiPath ProCenter IT Monitor)
SNMP Support	Standard (any product that can compile an MIB-management information base)	Optional (any package which supports SNMP alerts)	Optional (any package which supports SNMP alerts)
Price per Agent/Station (US$)	565 to 900 per seat (software solution 20-seat, including skill-based routing and real-time/historical reporting)	41,000 per system (1,170/agent -- based on 35-agent configuration)*	13,500 per system (385/agent seat -- based on 35-agent configuration)*

	Siemens Communications, Inc.	Tadiran Telecom	Tadiran Telecom
	Siemens HiPath ProCenter Standard Suite	**Composit Express**	**Composit Pro**
System Configuration	Implemented with software platform located on Windows Server	Server-based software solution with Intel/Dialogic voice cards	Server-based software solution with Intel/Dialogic voice cards
Operating System(s) Supported	Windows 2000	Windows 2000 Server, Windows 2000 Professional, Windows XP, Citrix and TS solutions	Windows 2000 Server, Windows 2000 Professional, Windows XP, Citrix and TS solutions
Max. Number of Digital Trunks Supported	5,760	PBX-dependent (60 for IVR)	PBX dependent, multiple IVR servers can be used (180 per IVR server)
Max. Number of IP Trunks Supported	5,760	60	PBX dependent
Max. Number of Active Agents Supported	1,250 (per site)	60	250 on single server
Max. Number of Supervisor Positions Supported	300	No software limitations	No software limitations
Busy Hour Call Completions (Peak--one hour)	8,000 (per site)	8,000	12,000 per suite
Interactive Voice Response (IVR) Support	Optional (HiPath ProCenter Prompt Response or Advanced Speech Recognition)	Standard	Standard (DTMF), optional (Speech)
Max. Number of Skills Groups	100	No software limitations	No software limitations
CRM Interface Support	Optional (third-party applications)	Optional (general Composit pop-up customer information screen is available - OBDC supported database, to other CRM applications that support OCX/DLL APIs - using SDK)	Optional (Siebel, PeopleSoft, Vantive, Pivotal, AS/400, Mainframe) all CRM applications that support OCX/DLL APIs + all ODBC databases
IP Support	Optional (supported with Siemens HiPath 5000)	Standard (with Tadiran Coral PBX)	Standard
Voice Recording/Logging Support	Optional (Siemens Xpressions or third-party applications)	Not available	Optional
Agent Monitoring	Optional (Comverse Quality Management)	Standard	Standard
Real-Time Display of Call/Agent Statistics	Optional (HiPath ProCenter Supervisor & HiPath ProCenter Agent)	Standard	Standard
SNMP Support	Optional (any package which supports SNMP alerts)	Not available	Not available
Price per Agent/Station (US$)	25,500 per system (728/agent -- based on 35 agent configuration)	1,000 starting price per seat (1-IVR port per agent seat)	1,600 starting price per seat (1 IVR port per agent seat)

	Telephony@Work, Inc.	Wicom Communications	Zeacom Group
	CallCenterAnywhere (CPE Edition)	**Wicom IP Contact Center Solution**	**Q-Master**
System Configuration	Software solution that scales to carrier levels -- can run on one server or with distributed processes across a network	Software-based switching with off the shelf voice gateways interfacing to PSTN and/or PBX	Implemented as server-based software, PBX integrated
Operating System(s) Supported	Microsoft Windows 2003/2000/NT 4.0 Sun Solaris and Compaq Tru64 UNIX and Xserve	Windows 2000, Windows 2003 Server, Windows XP	Windows 2000 and 2003 server
Max. Number of Digital Trunks Supported	Up to 27,160 voice media streams per 42U rack for VoIP softswitch.	Unlimited by adding VoIP gateway and server capacity	PBX-dependent (1,500 with NEC PBXs)
Max. Number of IP Trunks Supported	No software limitations	Unlimited by adding VoIP gateway and server capacity	PBX-dependent (1,500 with NEC PBXs)
Max. Number of Active Agents Supported	Software validated up to 50,000 simultaneous users in Enterprise version (Service Provider version supports 10 million users)	1,000 per Wicom CEM Server (50,000 by adding Wicom CEM server capacity)	350
Max. Number of Supervisor Positions Supported	No software limitations	10,000 per Wicom CEM Server	99
Busy Hour Call Completions (Peak--one hour)	1.3 million interactions/hour per single quad CPU application server (assumes call length = 1 minute), multiple servers grow this number arithmatically	110,000 (per Wicom CEM Server)	8,000 (PBX-dependent)
Interactive Voice Response (IVR) Support	Standard	Standard	Optional
Max. Number of Skills Groups	No software limitations	500	No software limitations
CRM Interface Support	Standard (support for ODBC and JDBC-compliant databases, published API for integrating with CRM applications)	Standard (integration interfaces are based on Web services technology)	Optional (Siebel, Remedy, Microsoft CRM, Onyx, Vantive, others plus all ODBC compliant databases)
IP Support	Standard	Standard	Standard
Voice Recording/Logging Support	Standard	Optional	Optional
Agent Monitoring	Standard (includes call monitoring with whisper coaching capability, barge-in, take-over, on-the-fly recording, broadcast messaging, chat, screen monitoring)	Standard	Standard
Real-Time Display of Call/Agent Statistics	Standard	Standard	Optional
SNMP Support	Standard	Standard	Standard
Price per Agent/Station (US$)	2,500 per simultaneous interaction* (Enterprise Edition - logins & seats are included - licenses used only for active communications)	Pricing is based on either one-time license fee or monthly-based ASP fee. Agent license price is approx. 2,600 USD per agent or approx. 80 USD/month per agent.	1,107 per agent based on 50 users - including design, installation and training

Disclaimer: This report draws information from research publications of international IT consultancy firms. The sources of all third party content are mentioned. The content may have been edited for the purpose of brevity. The report is intended for PSEB's internal use only.