

# WHITE PAPER

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Compaq Computer  
Corporation

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## Genesys CTI Applications on Compaq ProLiant Servers

*Computer Telephony Integration (CTI) harnesses computing power to integrate critical business information with the telephone and other communications media. The benefits that CTI has brought to corporations include enormous savings of personnel time while delivering improved customer service.*

*In today's competitive environment, companies are looking for every opportunity to serve their customers better. This renewed emphasis toward customer service has made call centers utilizing CTI solutions an important part of corporate IT strategies, affecting enterprise-level spending and decision making.*

*The combination of Compaq's range of standards-based, flexible, industry-leading platforms for computer telephony and telecommunications applications and Genesys comprehensive suite of CTI applications allows a call center to easily deploy and optimally manage its customer interactions and employee communications. The call center is then able to increase productivity, lower costs, and achieve greater customer satisfaction and loyalty.*

*This document provides an overview of the Genesys suite of CTI applications, sample installation instructions, and sample call center performance data to assist in understanding how the Compaq/Genesys solution could perform in your environment.*

**COMPAQ**

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## Genesys CTI Applications on Compaq ProLiant Servers

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## EXECUTIVE SUMMARY

For years, call centers have been the primary means for companies to provide customer service and telesales. The advent of 800 (toll free) number portability in the early 1990s, technological improvements in call center hardware platforms, and the increasing sophistication of call center applications resulted in industry growth rates of over 20 percent for the last five years.

As the call center industry heads into the millenium, growth remains strong, but the drivers for the growth have notably changed. Growth is no longer driven primarily by very large call centers (over 1000 seats) employing highly proprietary hardware platforms and applications, but is being driven instead by call centers with under 500 seats using more open platforms and solutions. The increased importance of Information Technology (IT) and its evolution from a cost-centric functional area to a strategic enabler of business solutions has resulted in IT assuming a greater role in the management of the direction of call centers. Companies now view the call center as a strategic point of contact with the customer.

Compaq Computer Corporation and Genesys Telecommunications Laboratories, Inc. announced an alliance in August of 1997 aimed at delivering optimized hardware-software solutions for the call center market in an effort to market optimized mission-critical call center solutions on open, industry-standard platforms.

Now, more than ever, the benefits of open, standards-based platforms for computer telephony integration are becoming evident to enterprise customers and network service providers. Compaq ProLiant Servers offer excellent reliability for example: redundant power supplies, redundant cooling fans, hot-pluggable devices, and ECC memory to name just a few. Compaq networking products, such as the Netelligent 10/100 TX PCI UTP Controller card, and management tools, such as Compaq Insight Manager, have been thoroughly tested in Compaq servers. Compaq customers trust the standard quality and reliability of the ProLiant Server to protect their applications and data.

The combination of Compaq ProLiant servers, Genesys' open, scaleable Computer Telephony Integration (CTI) software and support from key integrators will fill a critical void in today's enterprise computing landscape and will allow customers to easily and rapidly deploy and utilize CTI in call centers.

This white paper gives an overview of the Genesys suite of applications, and performance examples of Compaq products installed in a small or large call center environment.

## THE COMPAQ-GENESYS PARTNERSHIP

Compaq Computer Corporation and Genesys Telecommunications Laboratories have established an alliance which will initially focus on the North American and European markets, with joint testing and co-marketing intended to efficiently deploy computer-telephony integration (CTI) into call centers.

The increased need to focus more of a company's resources toward serving customer needs has led to increasing complexity in the call center. No simple solutions exist, and no one vendor is capable of delivering the entire solution, at least not one that is open and versatile enough to evolve with an organization's changing needs. Many call center managers feel overwhelmed by the complexity they encounter in managing both new technology and a workforce with changing skills (as agents become more proactive representatives and not just order takers). They look to a few vendors or integrators who can be long-term partners and keep users on the leading edge. They need vendors to be able to think holistically about the needs of the call center and the enterprise as a whole, and how to best apply technology to address these needs.

The Compaq-Genesys team, working in conjunction with leading systems integrator partners that typically influence call center planning at high levels in organizations, can offer a valuable long term proposition to the call center manager.

Two Competence Centers (Houston and San Francisco) have been established to perform the following key activities:

- Joint engineering development projects
- Pre-sales support to subsidiaries and partners
- Pre-sales and post-sales critical customer support
- Major account briefings
- Platform certification
- Benchmarking
- System sizing methodology and sizing server
- Platform specific engineering projects
- Development of support tools
- Publication of White Papers
- Marketing
- Event Support

By focusing on needs assessment, planning, deployment, and operations, the Competence Center will accelerate and simplify the migration process to open standards-based solutions for call centers.

Genesys has also selected Compaq as their Windows NT development platform of choice. This provides added "peace of mind" knowing the applications were developed on the same servers being deployed in your call center environment.

The work that Compaq has already done with strategic partners such as Microsoft and Oracle also benefits this relationship. Both Windows NT Operating Systems and Oracle databases have been optimized and tuned to run on Compaq ProLiant Servers, allowing you to focus on the Genesys applications.

Installation support for both Windows NT and Oracle is included in the easy to use SmartStart program that ships with each Compaq ProLiant Server. SmartStart enables customers to automate the installation of these programs thereby reducing installation error and load time.

### **High Availability**

Compaq understands that system availability is critical to the success of the operation of a call center, and any loss of availability translates into a loss of time and money. To protect the customer from such losses, Compaq offers many features that ensure Compaq servers provide maximum uptime with minimal maintenance requirements.

These features include:

- Redundant hardware components
- Automatic Server Recovery
- Server Failure Notification
- ECC Memory
- Graceful Power Down
- Memory Deallocation
- Power Safety Interlock
- Pre-Failure Warranty

Compaq has also been working closely with Microsoft during the development of Microsoft Cluster Server. When combined with Compaq ProLiant Servers, this product will provide an uncompromisingly high level of data, application and server availability needed to run business-critical software applications, such as the Genesys suite of products.

## GENESYS ARCHITECTURE

Genesys utilizes a client/server architecture where a server functions as a computer-telephony mediator and client API modules are hooked up to each application. Consequently, the client-server architecture simultaneously supports different applications and devices distributed across multiple platforms. Clients and servers use industry standard TCP/IP to communicate with each other, making the software portable across all the operating environments that support this protocol suite.

Table 1 lists the individual components of the Genesys Product Suite.

TABLE 1. GENESYS CURRENT PRODUCT SUITE COMPONENTS

Product	Area of Use	Description
T-Server	Framework	Open, scalable, multi-switch, multi-site foundation for intelligent customer interaction
DB Server	Inbound/Outbound	Provides universal access to the call center database
Stat Server	Inbound/Outbound	Constantly collects, sorts and processes data on call center events, converting it into short-term statistical information
Interaction Router (formerly ICD)	Inbound	Intelligent routing of customer interactions
Campaign Manager	Outbound	Provides automated blending of inbound and outbound call functions
Data Analysis and Routing Tool (DART)	Reporting	Historical reporting
Call Center Pulse	Reporting	Real-time monitoring of call center activity and business statistics
Agent Pulse	Reporting	Real-time monitoring of agent activity statistics

Figure 1 shows how these components work in a call center environment.

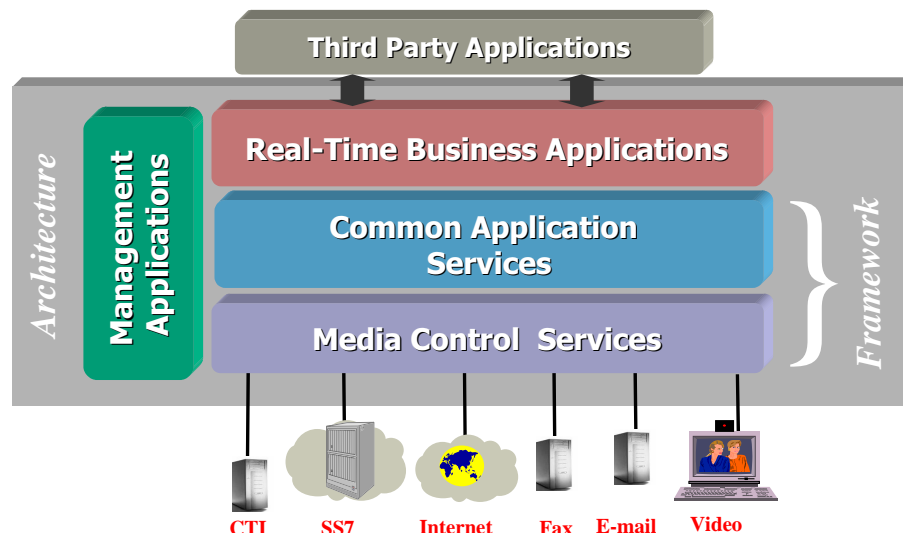


Figure 1. Genesys Framework and Applications

## INSTALLATION AND CONFIGURATION

Basic installation begins with Compaq SmartStart and then the Genesys components. You can use the examples listed in this document to assist in selecting appropriate hardware and the following sizer tools to assist you in selecting and configuring your database(s):

- Compaq ProLiant Server Sizer for Microsoft SQL Server, available at <http://www.compaq.com/solutions/enterprise/database-mssqlserver.html>
- Oracle System Sizer, available at <http://www.compaq.com/solutions/enterprise/database-oracle.html>

Use SmartStart to configure Compaq hardware, install Compaq support software, automatically update Compaq drivers, and simplify the installation and optimization of Microsoft Windows NT Server 4.0 and an Oracle or Microsoft SQL database. See the Compaq SmartStart documentation for specific installation instructions.

After installing the operating system and an Oracle or Microsoft SQL database, the Genesys components can be installed in any order at any time. InstallShield ® makes the installation process very simple by automatically copying necessary files, prompting you to confirm various defaults, and giving you any instructions you need. Refer to the Genesys installation guides for more detailed instructions.

After installation, each of the Genesys products must be properly configured. See Appendix A for sample installation and configuration instructions.

Refer to the Large Call Center example section for multiple server configurations.

The following White Papers, available at <http://www.compaq.com/support/techpubs/whitepapers>, may also be helpful for installation and configuration, and to enhance performance:

*Compaq ProLiant 7000 Server Technology*

*Compaq SmartStart*

*Disk Subsystem Performance and Scalability*

*Backup Basics*

*Compaq DLT Library Technology*

*Insight Asynchronous Management for Windows NT*

*Configuration and Tuning of Oracle7 Server for Windows NT on Compaq Servers*

*Configuration and Tuning of Microsoft SQL Server 6.5 for Windows NT on Compaq Servers*

*Configuration and Tuning of Sybase System 11 for Windows NT on Compaq Servers*

*Compaq ProLiant 6500/7000 vs. Sun Ultra Enterprise 450*

## EXAMPLE OF A SMALL CALL CENTER

This section summarizes the results of the recent performance benchmark tests performed on Genesys T-Server, Inbound (ICD 5.0.5) products. These tests were performed in the Compaq Telecom Lab using Compaq ProLiant servers with Windows NT Server 4.0 and Microsoft SQL Server 6.5 installed via SmartStart.

Please note that these benchmarks were performed with ICD 5.0.5 (based on the 5.1 architecture) and DB Server 5.0.100 (with Native DB interface support).

This information can be used when formulating configuration recommendations for customers installing these Genesys products on Compaq platforms running Windows NT. Actual performance may vary depending upon switch, IVR, server configuration, server OS, other network traffic, customer database configuration, and so on.

### Description of Benchmarking

The following versions of the applications were used:

TABLE 2. VERSIONS OF APPLICATIONS USED

Product	Version
T-Server	G3tcp, 5.0.033
DB Server	5.0.104
Stat Server	5.0.016
CC Pulse	5.0.014
Agent Pulse	5.0.018
SCE	5.0.008
Campaign Manager	5.0.1
Microsoft SQL	6.5
List Manager	5.0.007
ICD Router	5.0.500
ICD Client	5.0.023



The benchmarks were run on Compaq ProLiant 4-way 200Mhz PentiumPro Servers and typically configured with 256-MB of memory. All Genesys applications were loaded on the following Compaq Server(s) connected via a Compaq Netelligent 5606 100 Base-T Switch.

TABLE 3. SMALL CALL CENTER INBOUND SERVER CONFIGURATION

Server #	Description	Software Components
1	ProLiant 6500, 256-MB RAM, 10/100 Base T-NIC	<ul style="list-style-type: none"> <li>Windows NT 4.0 with Service Pack 3</li> <li>Genesys T-Server</li> <li>Genesys StatServer</li> <li>Genesys DBServer</li> <li>Genesys Interaction Router</li> </ul>
2	ProLiant 6500, 256-MB RAM, 10/100 Base T-NIC	<ul style="list-style-type: none"> <li>Windows NT 4.0 with Service Pack 3</li> <li>G3 Simulators</li> </ul>
3	ProLiant 6500, 128-MB RAM, 10/100 Base T-NIC	<ul style="list-style-type: none"> <li>Windows NT 4.0 with Service Pack 3</li> <li>Microsoft SQL Server 6.5</li> </ul>

*Note: Since individual Genesys server processes except for DB Server clients are not multi-threaded, the results relate only to utilization of a single CPU.*

For this example, all applications except the SQL database were installed on a single ProLiant 6500

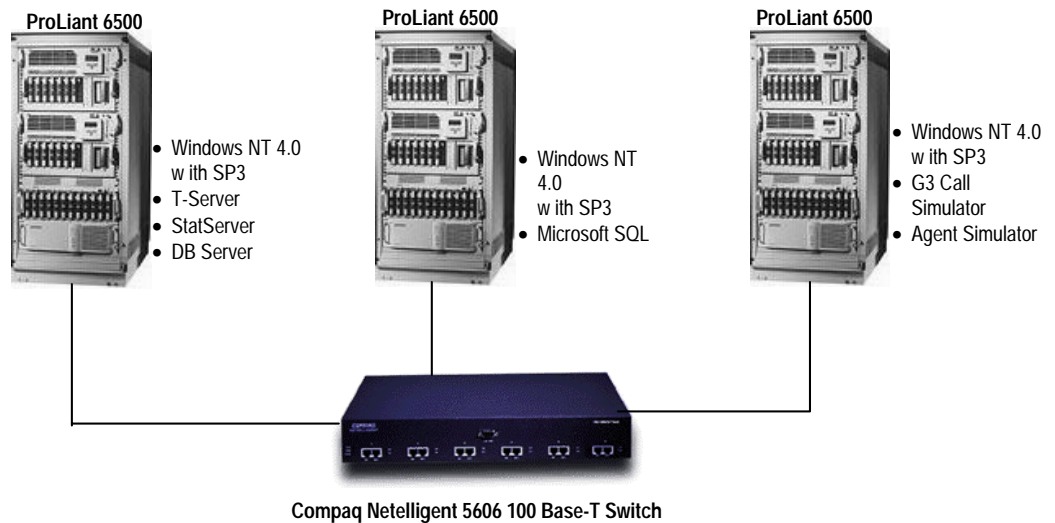


Figure 2. Small Call Center Test Configuration

The configuration for performance testing was as follows:

- No Interactive Voice Response system (IVR) was used. Use of an IVR can impact performance.
- PBX simulator for Lucent G3 was used. This simulator is not performance limited by actual switch characteristics thereby enabling optimum measurement of the server's capabilities. The PBX Simulator and Autoserver (for client/agent simulation) were always run on dedicated physical machines.
- Other network traffic was assumed to be minimal and was monitored for external activities effecting the benchmarking results. However, because network traffic can impact performance, Compaq recommends using Netelligent 10/100 TX PCI UTP Controller cards at both the agent and server level.
- Microsoft SQL database was used on a dedicated server.

*Note: Performance measurements can be dramatically impacted if the verbose option in T-Server and ICD Server is set to "true."*

*Note: Performance measurements can be dramatically impacted if the debug option in StatServer Management Client is turned "on."*

- The model Call Center Database was configured as follows for running Genesys products:
  - 280 agents, 280 DNS, 4 queues, 4 routing points
- A simple call scenario was used (10 events). The call terminated at an agent and was not transferred (for estimation purposes you can count a transfer as an additional call).
- Various talk times were used, from 15 seconds up to 3 minutes.
- *Verbose* option for T-Server and ICD Server was set to “false” in their respective configuration files.
- *Debug* option for StatServer Management Client was set to “off” in the configuration file.

### Maximum Call Processing Results

The following table summarizes the maximum call processing loads achieved during the testing. In some cases these are not necessarily the maximum that could be achieved if additional simulated resources (trunks, agents, etc.) were used.

TABLE 4. CALL PROCESSING LOAD SUMMARY

Product	Agents	CPU%	Memory Utilization MB	Call/Sec	Comments
ICD	280	6.9	2.770	64	Simple strategy used (OEqual_Each)
Stat Server (used for ICD)	280	2.3	3.030	64	Simple strategy used (OEqual_Each)
T-Server (used for ICD)	280	28	2.650	64	Simple strategy used (OEqual_Each)
ICD	280	13	3.080	64	XDataEqual strategy
Stat Server (used for ICD)	280	4.9	2.460	64	XDataEqual strategy
T-Server (used for ICD)	280	37.5	2.690	64	XDataEqual strategy
ICD	280	43	3.540	96	GroupEqual_MaxWait
Stat Server (used for ICD)	280	7.21	2.620	96	GroupEqual_MaxWait
T-Server (used for ICD)	280	39.3	2.760	96	GroupEqual_MaxWait
ICD	280	85	4.590	56	Xdata_List
Stat Server (used for ICD)	280	9.3	2.980	56	Xdata_List
T-Server (used for ICD)	280	27.5	2.560	56	Xdata_List

### **ICD 5.0.5 Performance**

Four new routing strategies were used to benchmark ICD performance. Calls were distributed to 4 queues each running the same strategy. Significant improvements were seen over previous 5.0.5 versions of ICD.

**Strategy 1      QEqual\_each**

All agents receive calls with equal probability.

**Strategy 2      XdataQequal**

All agents receive calls with equal probability. Every call initiates fulfillment of DB procedure (for data processing).

**Strategy 3      GroupEqual\_MaxWait**

There are several agent groups. The calls are uniformly distributed among the groups. MaxWaitTime statistic is used for distribution of calls inside the group.

**Strategy 4      Xdata\_List**

The calls are uniformly distributed among the groups. The StatTimeInReadyState statistic is used for distribution of calls among the agents inside the group. The lists of agents are taken from DB by using a DB procedure.

**Benchmarking Results – CPU % Utilization**

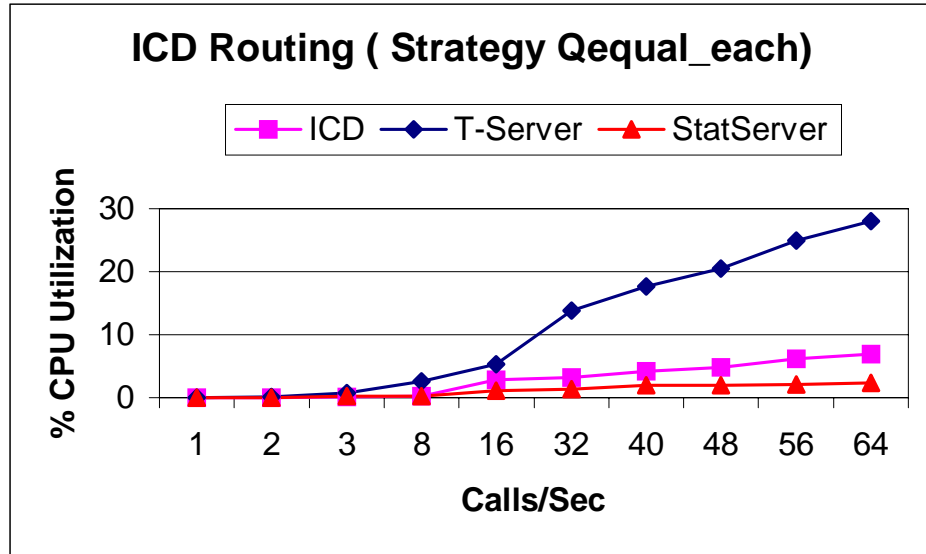


Figure 3. % CPU Utilization Using Qequal\_each Strategy

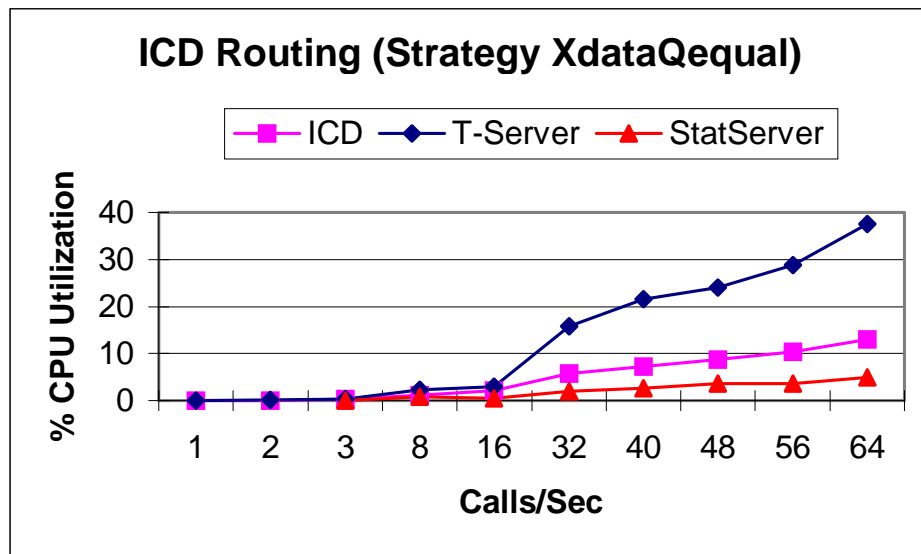


Figure 4. % CPU Utilization Using XdataQequal Strategy

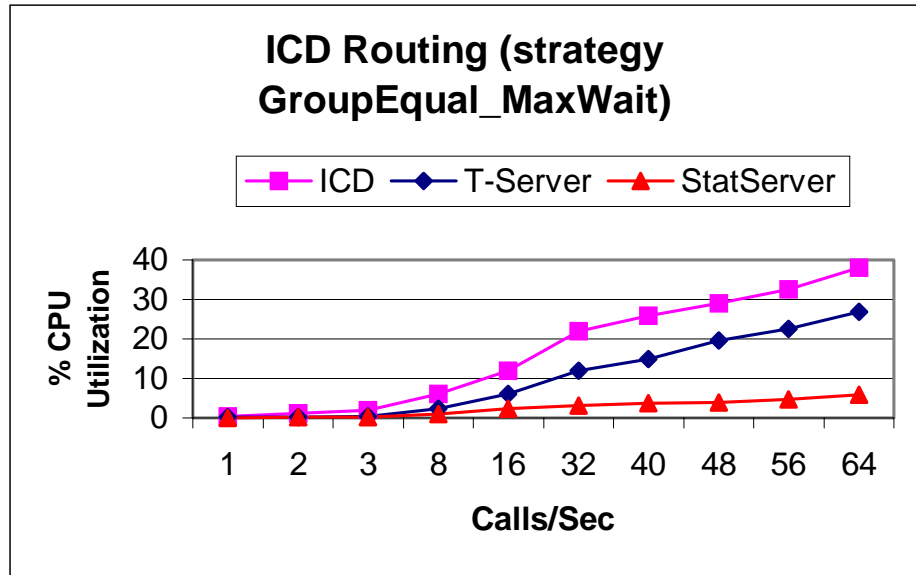


Figure 5. % CPU Utilization Using GroupEqual\_MaxWait Strategy

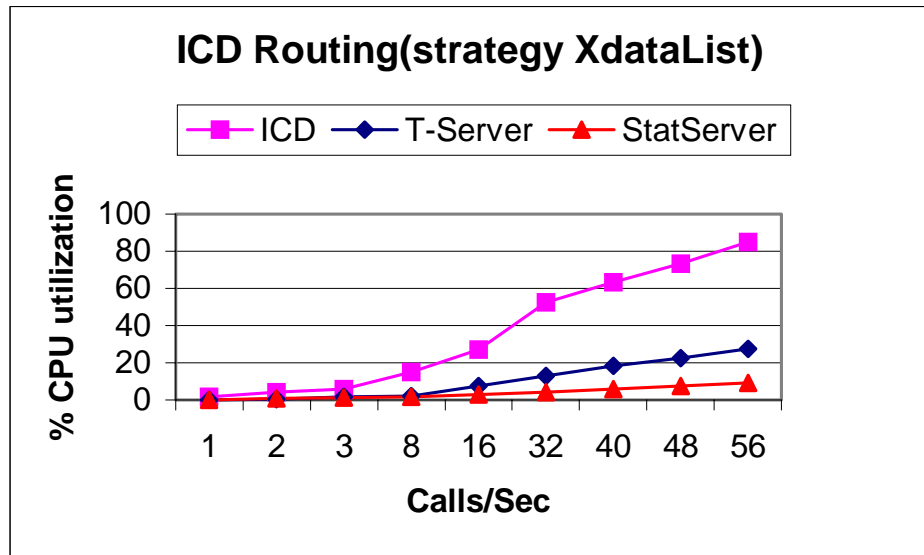


Figure 6. % CPU Utilization Using XdataList Strategy

## Summary

As indicated by the data in Table 4 and Figures 2-5, the use of call strategies can have a significant effect on the number of calls per second that can be processed. However, other factors must be considered.

For example, use of the Xdata\_List strategy does not provide the highest number of calls per second to be processed, but the calls have been strategically routed to the right agent based on who's calling, the caller's past history, and the nature of the call. Consequently the length of the call is potentially lowered, while the satisfaction of the customer is most likely raised. Note the increased CPU utilization for ICD in Figure 5, showing its increased usage with the Xdata\_list strategy.

In all testing that was performed, the single Compaq ProLiant running Windows NT 4.0 easily handled the call-processing load, as indicated by the low CPU % utilization figures. For this size call center, you may consider adding a second server for added availability.

## EXAMPLE OF A LARGE CALL CENTER

This section summarizes the results of recent performance benchmark tests performed on Genesys T-Server, Inbound (ICD 5.0.5), Outbound, and Reporting products. These tests were performed in the Compaq Telecom Lab and Genesys Performance Lab using Compaq ProLiant servers with Windows NT Server 4.0 installation.

Please note that these benchmarks were performed with the ICD 5.0.5 (based on the 5.1 architecture) and DB Server 5.0.100 (with Native DB interface support).

This information can be used when formulating configuration recommendations for customers installing these Genesys products on Compaq platforms running Windows NT. Please note that actual performance may vary depending upon switch, IVR, server configuration, server OS, other network traffic, customer database configuration, and so on.

### Description of Benchmarking

The following versions of applications were used:

TABLE 5. VERSIONS OF APPLICATIONS USED

Product	Version
T-Server	G3tcp, 5.0.033
DB Server	5.0.104
Stat Server	5.0.016
CC Pulse	5.0.014
Agent Pulse	5.0.018
SCE	5.0.008
CM	5.0.1
Oracle	7.3.2
Microsoft SQL	6.5
List Manager	5.0.007
ICD Router	5.0.500
ICD Client	5.0.023

The benchmarks were run on Compaq ProLiant 1, 2, or 4-way 200Mhz PentiumPro Servers and typically configured with 128-MB or 512-MB of memory. Each Genesys application was loaded on the following Compaq Server(s) via a Compaq Netelligent 5606 100 Base-T Switch.

TABLE 6. LARGE CALL CENTER INBOUND SERVER CONFIGURATION

Server #	Description	Software Components
1	ProLiant 6500, 128-MB RAM, 10/100 Base T-NIC	<ul style="list-style-type: none"> <li>Windows NT 4.0 with Service Pack 3</li> <li>Genesys T-Server</li> </ul>
2	ProLiant 6500, 128-MB RAM, 10/100 Base T-NIC	<ul style="list-style-type: none"> <li>Windows NT 4.0 with Service Pack 3</li> <li>Genesys StatServer</li> <li>Genesys Interaction Router</li> </ul>
3	ProLiant 6500, 128-MB RAM, 10/100 Base T-NIC	<ul style="list-style-type: none"> <li>Windows NT 4.0 with Service Pack 3</li> <li>G3 Simulators</li> </ul>
4	ProLiant 7000, 512-MB RAM, 10/100 Base T-NIC	<ul style="list-style-type: none"> <li>Windows NT 4.0 with Sservice Pack 3</li> <li>Genesys DBServer</li> <li>Oracle 7.x</li> </ul>

**Note:** Since individual Genesys server processes except for DB Server clients are not multi-threaded, the results relate only to utilization of a single CPU.

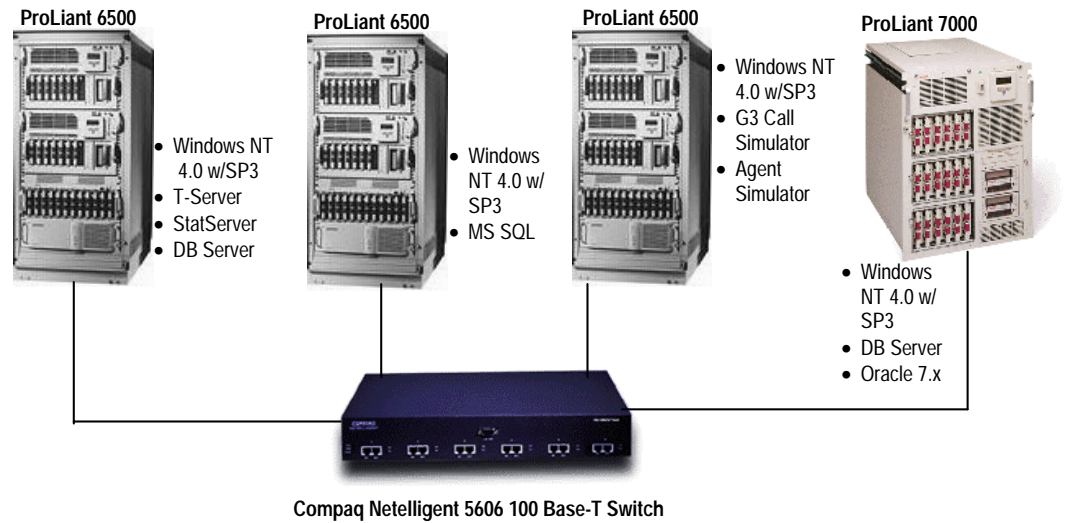


Figure 7. Large Call Center Inbound Server Test Configuration



TABLE 7. LARGE CALL CENTER OUTBOUND SERVER CONFIGURATION

Server #	Description	Software Components
1	ProLiant 6500, 128-MB RAM, 10/100 Base T-NIC	<ul style="list-style-type: none"> <li>Windows NT 4.0 with Service Pack 3</li> <li>Genesys T-Server</li> <li>Genesys S-Dialer</li> </ul>
2	ProLiant 6500, 128-MB RAM, 10/100 Base T-NIC	<ul style="list-style-type: none"> <li>Windows NT 4.0 with Service Pack 3</li> <li>Genesys StatServer</li> <li>Genesys Campaign Manager</li> <li>Genesys CCE</li> </ul>
3	ProLiant 6500, 128-MB RAM, 10/100 Base T-NIC	<ul style="list-style-type: none"> <li>Windows NT 4.0 with Service Pack 3</li> <li>G3 Simulators</li> <li>Genesys List Manager</li> </ul>
4	ProLiant 6000, 512-MB RAM, 10/100 Base T-NIC	<ul style="list-style-type: none"> <li>Windows NT 4.0 with Service Pack 3</li> <li>Genesys DBServer</li> <li>Microsoft SQL Server 6.5</li> </ul>

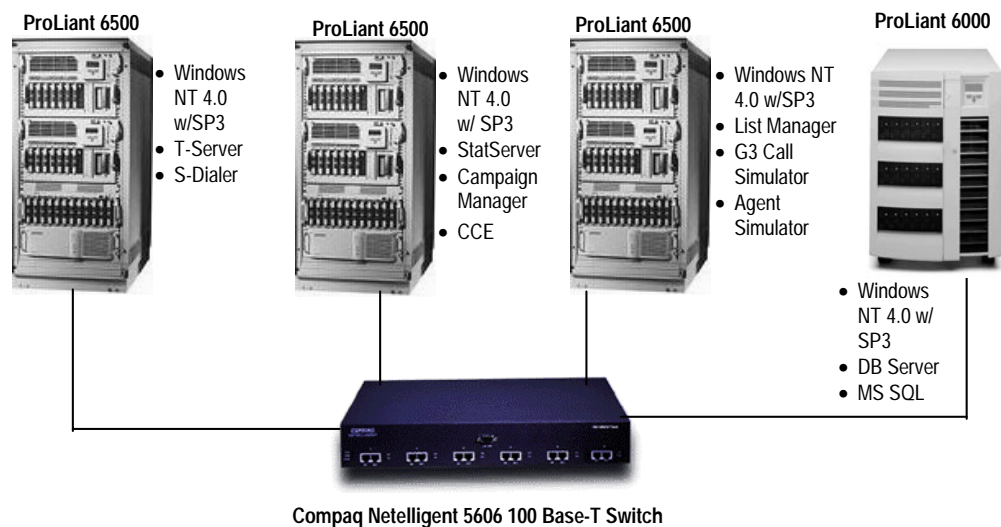


Figure 8. Large Call Center Outbound Server Test Configuration

The configuration for performance testing was as follows:

- No Interactive Voice Response system (IVR) was used. Use of an IVR can impact performance.
- PBX simulator for Lucent G3 was used. This simulator is not performance limited by actual switch characteristics thereby enabling optimum measurement of the server's capabilities. The PBX Simulator and Autoserver (for client/agent simulation) were always run on dedicated physical machines. Short talk times were used to increase calls/sec processed within a given set of simulated resources.
- T-Server was always run on its own dedicated server, even when benchmarking Inbound and Reporting products.
- Other network traffic was assumed to be minimal and was monitored for external activities effecting the benchmarking results. However, because network traffic can impact performance, Compaq recommends using Netelligent 10/100 TX PCI UTP Controller cards at both the agent and server level.
- Inbound Suite was tested with ICD, Stat Server and DB Server, each on a separate system.

*Note: Performance measurements can be dramatically impacted if the verbose option in T-Server and ICD Server is set to "true."*

*Note: Performance measurements can be dramatically impacted if the debug option in StatServer Management Client is turned "on."*

- Real-time Reporting was measured with Stat Server and DB Server each on a separate system. Multiple CC Pulse programs were used.
- In most cases an Oracle database was used, and it was installed on the same machine as the DB Server. In some cases (as noted below), a Microsoft SQL database was used.
- Three model Call Center Databases were configured for running Genesys products:
  - 280 agents, 280 DNs, 4 queues, 4 routing points;
  - 500 agents, 500 DNs, 4 queues, 7 routing points;
  - 1000 agents, 1000 DNs, 4 queues, 11 routing points;
- A simple call scenario was used (10 events). The call terminated at an agent and was not transferred (for estimation purposes you can count a transfer as an additional call).
- *Verbose* option for T-Server and ICD Server was set to “false” in their respective configuration files.
- *Debug* option for StatServer Management Client was set to “off” in the configuration file.

### Maximum Call Processing Results

The following table summarizes the maximum call processing loads achieved during the testing. The inbound and outbound test suites were run at separate times. In some cases these are not necessarily the maximum that could be achieved if additional simulated resources (trunks, agents, etc.) were used.

TABLE 8. CALL PROCESSING LOAD SUMMARY

Product	Agents	CPU%	Memory Utilization MB	Call/Sec	Total Calls/Sec	Comments
T-Server	280	33	2.650	100	2800	No attached data used in call scenario.
	500	62	2.810	120	60000	
	1000	86	3.006	150	150000	
T-Server	280	41	3.500	48	13440	IK attached data used in call scenario
	500	43	3.550	48	24000	
	1000	63	7.900	64	64000	
ICD	280	5.7	2.600	56	15680	Simple strategy used (QEqual_Each)
	500	6.0	3.000	56	28000	
	1000	6.2	2.700	56	56000	
Stat Server (used for ICD)	280	1.8	2.300	56	15680	Simple strategy used (QEqual_Each)
	500	3.6	2.900	56	28000	
	1000	3.4	3.900	56	56000	
ICD	280	9.9	2.700	64	17920	XDataEqual strategy
	500	10.0	2.900	64	32000	
	1000	11.0	3.300	64	64000	

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CALL PROCESSING LOAD SUMMARY (CONTINUED)

Stat Server (used for ICD)	280	2.4	2.400	64	17920	XDataEqual strategy
	500	5.0	2.900	64	32000	
	1000	5.0	4.000	64	64000	
ICD	280	35.0	3.400	64	17920	GroupEqual_MaxWait
	500	63.0	3.700	64	32000	
	1000	84.0	4.600	40	40000	
Stat Server (used for ICD)	280	4.4	2.600	64	17920	GroupEqual_MaxWait
	500	5.3	3.200	64	32000	
	1000	4.7	4.600	40	40000	
ICD	280	82.0	4.700	48	13440	Xdata_List
	500	70.0	5.200	48	24000	
	1000	86	11.000	48	48000	
Stat Server (used for ICD)	280	2.4	3.100	48	13440	Xdata_List
	500	6.0	3.500	48	24000	
	1000	14.3	6.900	48	48000	
Reporting – Stat Server	1000	7	8.359	16	16000	1 copy of CC Pulse used and running at 100% CPU
Reporting – Stat Server	1000	12	12.469	16	16000	2 copies of CC Pulse used and running at 100% CPU
Reporting – Stat Server	280	23	10.770	48	13440	4 copies of CC Pulse used and running at 100% CPU
	500	26	13.830	28	14000	
	1000	37	20.912	16	16000	
Reporting – Stat Server	280	65	19.044	48	13440	8 copies of CC Pulse used and running at 100% CPU
	500	53	24.772	28	14000	
	1000	100	37.532	16	16000	
Reporting – Stat Server	500	85	56.508	8	4000	Maximum of 23 CC Pulse clients handled by Stat Server

## Large Call Center Outbound Suite Performance

One major benefit of Enterprise ICD routing with call centers is the ability to blend inbound and outbound calls across the enterprise. Callers can be offered a “call back” within an agreed period because all agents are currently occupied. A few minutes later the Enterprise CTI Router can recognize the inbound queue has subsided and can start blending outbound “returned calls” into the free agents.

Benchmarking results for the Outbound Suite (Campaign Manager, List Manager, S-Dialer) depend upon the configuration of campaigns, database performance, and CPU performance.

An example of a test run with 8 calls/second and target busy factor of 85% is as follows:

- Number of record in dialing list (1 campaign) 40,000.
- Number of calls answered 15797.
- Number of Dials per agent per hour 96.4.
- Number of Dials answered per hour 38.
- Busy Factor Measured 96%.

TABLE 9. OUTBOUND CALL SUMMARY

Product	CPU % Utilization	Agents
T-Server	4.5%	300
DB-Server	1.5%	300
List Manager	43.1%	300
Campaign Manager	51.9%	300
S-Dialer	4.4%	300

### ICD 5.0.5 Performance

Four new routing strategies were used to benchmark ICD performance. Calls distributed to 4 queues each running the same strategy.

#### Strategy 1      QEqual\_each

All agents receive calls with equal probability.

#### Strategy 2      XdataQequal

All agents receive calls with equal probability. Every call initiates fulfillment of DB procedure (for data processing).

#### Strategy 3      GroupEqual\_MaxWait

There are several agent groups. The calls are uniformly distributed among the groups. MaxWaitTime statistic is used for distribution of calls inside the group.

#### Strategy 4      Xdata\_List

The calls are uniformly distributed among the groups. The StatTimeInReadyState statistic is used for distribution of calls among the agents inside the group. The lists of agents are taken from DB by using a DB procedure.

**Benchmarking Results – CPU % Utilization**

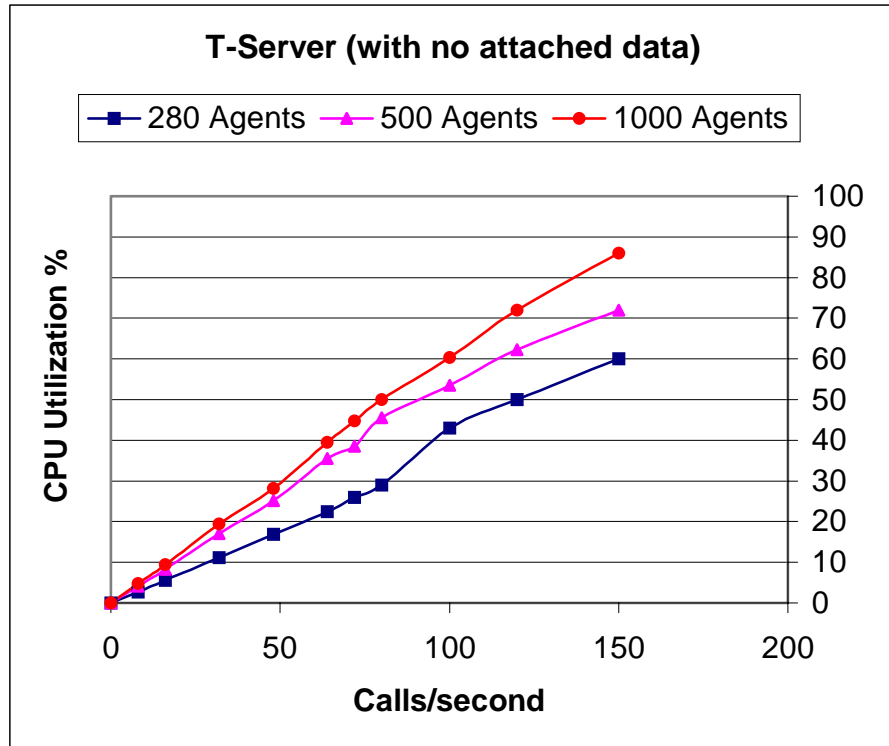


Figure 10. % CPU Utilization with no Attached Data

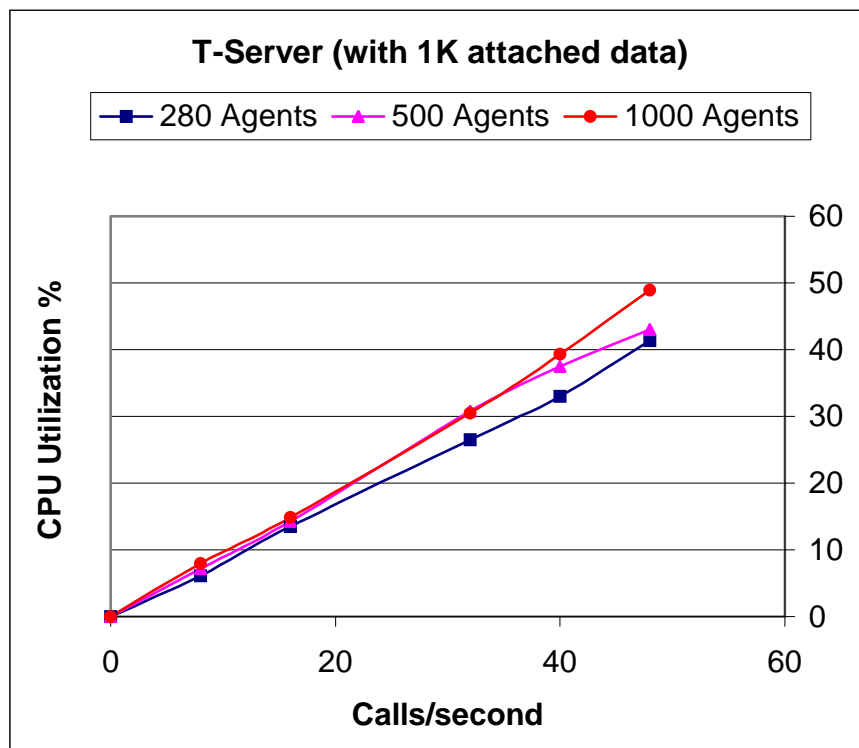


Figure 11. % CPU Utilization with 1K Attached Data

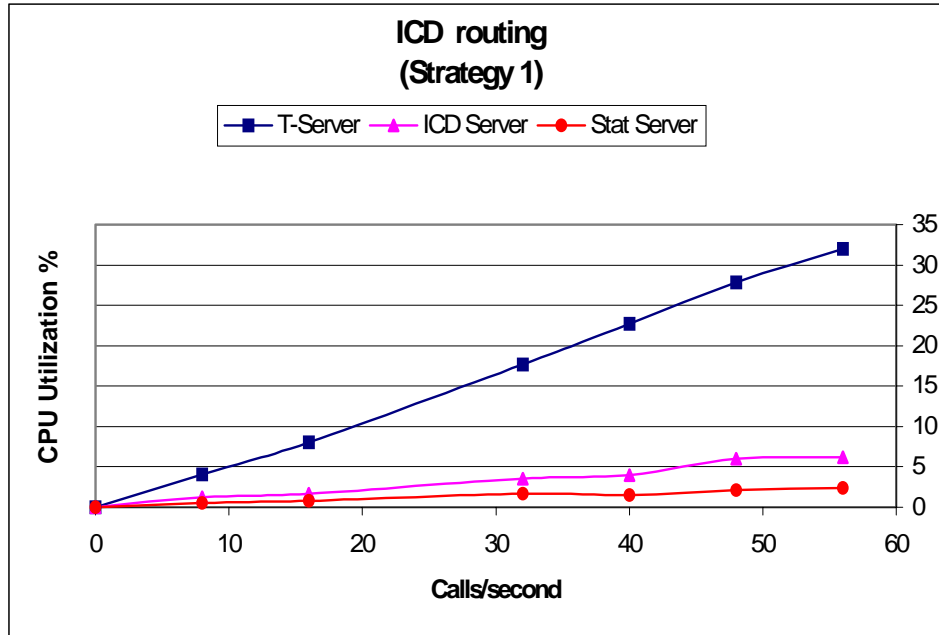


Figure 12. % CPU Utilization Using ICD Routing Strategy 1

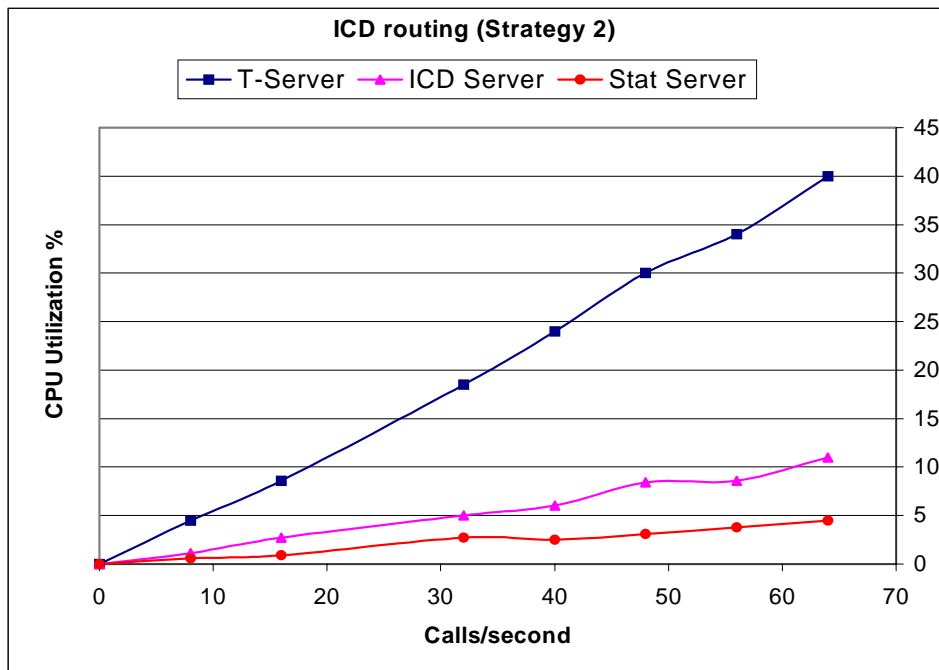


Figure 13. % CPU Utilization Using ICD Routing Strategy 2

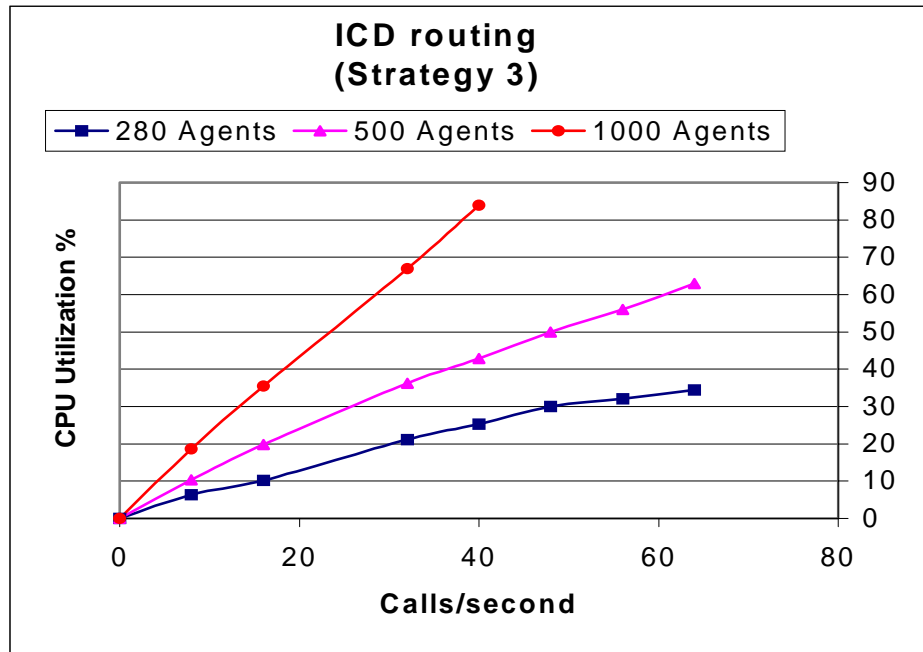


Figure 14. %CPU Utilization Using ICD Routing Strategy 3

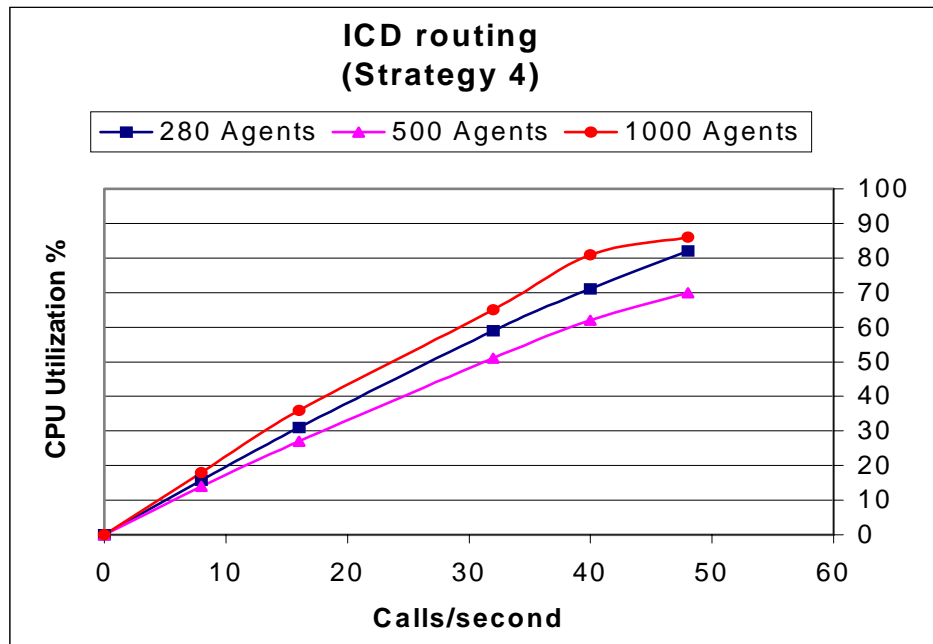


Figure 15. % CPU Utilization Using Routing Strategy 4

### **Summary**

As seen in the Call Processing Load Summary and the charts above, the Compaq ProLiant units had no trouble handling 1000 agents, even while performing processor-intensive tasks such as reporting.

The large number of calls per second is equal to the number of *customers* a call center is handling every second. The high-availability options of Compaq hardware, combined with Windows NT 4.0 and the Genesys applications provide a very stable call center platform.

Features such as Automatic Server Recovery and Compaq-engineered PCI Hot Plug technology enhance traditional fault-tolerant solutions such as RAID to provide maximum uptime with minimal maintenance requirements.



## CONCLUSION

The call center industry continues to evolve with the availability of increasingly sophisticated CTI solutions, but the process of deployment has typically been difficult and involved significant levels of customization. With the partnership of Compaq and Genesys, a leading suite of CTI applications can be delivered on a high availability, reliable, market-leading Windows NT platform, with the promise of improved time to deployment, significant cost efficiency (both for installation and support), repeatability and predictability.

This means more companies can take the call center to the next level – the customer interaction center that is tied to the rest of the enterprise – with confidence that the center can continue to grow and serve the customer, unhindered by the limitations of legacy systems, proprietary hardware and applications.

In the first three quarters of 1997, Compaq provided more than twice as many servers in the worldwide market than the nearest competitor. Compaq delivers systems that provide total value to the customer, unprecedented design and engineering technology, key management solutions, and strategic partnering with companies such as Genesys to provide seamless integration.

The scalability and reliability of Compaq hardware, Windows NT 4.0, and the Genesys suite of products allows customers to be confident in their deployment of any size call center.

## APPENDIX A – SAMPLE T-SERVER INSTALLATION AND CONFIGURATION

After using Compaq SmartStart, the Genesys components can be installed in any order at any time. InstallShield ® makes the process very simple by automatically copying necessary files, prompting you to confirm various defaults, and providing on screen instructions. Following is an example for the installation and configuration of the T-Server application.

### Installing Genesys T-Server

When installing T-Server 5.0 on Windows NT, the hard drive must be formatted in DOS FAT format, rather than in NTFS format.

Because T-Server 5.0 uses InstallShield ®, the installation process is very simple.

1. Insert the T-Server CD into your CD-ROM drive and select Start/Run from the main menu.
2. Type **n:setup** in the Run window (where **n** = the designation of the source CD drive), then press Enter.
3. From this point the installation proceeds automatically, prompting you to confirm the various defaults and giving you any instructions you need. By default, T-Server is installed in a directory called C:\GCTI\TSERVER. At present, you cannot choose to install T-Server in any other directory.
4. After all files have been installed, InstallShield ® will ask whether you want to install the T-Server daemon as an NT Service. Genesys recommends that you do run T-Server as an NT Service. This allows the license to boot automatically when you start your machine and will run as a daemon, even if the computer screen is locked. You also have the option of starting T-Server manually later, or setting the NT Service later as well. Select **Yes** and a program group is created in your Program Manager.
5. You are prompted for information about service configuration, with default settings already provided. Be sure that the **Automatic Startup** option is selected, so that T-Server will start automatically when your system boots. If you select **Manual Startup**, you will have to start T-Server manually as an application.
6. After you set up the Service options, InstallShield ® will ask if you want to register any dependent services. At this point you **must** register License Manager as a dependent service, by typing **lmgrd\_service** in the window and pressing Enter.

Once you set the NT Service options, your installation is complete. A T-Server program group has been added to your Program Manager. Besides an Uninstall icon and an icon for starting T-Server, this group contains a Configuration icon, which is a shortcut to the T-Server configuration file, **tserver.cfg**. This makes it easy to set the configuration options, which is the next step after installation. Information on configuration is presented in the next section.

### Configuration

After installing the appropriate files, each Genesys product must be properly configured.

#### Configuring T-Server

The T-Server configuration file is located in \GCTI\Tserver\tserver.cfg. See Table A-1 for an explanation of T-Server options.

Sample Configuration File

```
[default]
port=3333
verbose=true
phone-file=phone.file
log-file-name=c:\tmp\tserver\log
log-file-size=1000000
log-buffering=off
g3-hostname=asai-link
g3-port=5678
g3-link-number=3
g3-print-heartbeat=off
```

TABLE A-1. T-SERVER CONFIGURATION OPTIONS

Option	Description	Default Value	Valid Values	Example
port	Specifies which TCP port T-Server clients will use to establish connections with T-Server.	None; a value must be specified	Any valid TCP/IP port	port=3000
verbose	Controls T-Server's message log function. When this value is "true" a message log will be created, either in a log file or onscreen depending on the value specified in option log-file-name. If the parameter is set to "false," no message log will be created.	false	true, false	verbose=true
log-file-name	Specifies the name of the log file. If no value is supplied, T-Server will display the log directly onscreen and the log record will not be saved. NOTE: You may assign any name you like to the log file, but you should be sure it is located on the same host machine as T-Server itself.	log is generated to screen rather than to a file	Any valid file name	log-file-name=logfile
log-file-size	Sets the maximum size (in bytes) of the log file, after which a new file is created. Depending on which log-remove-old-file option is selected, the new file will have the same name as the old, which will be erased, or will be given a new name based on date and time of creation.	None; a value must be supplied	Any positive integer	log-file-size=256000







