



IP Telephony

Contact Centers

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# **Flat, Consolidated, and Extended: A New Multi-site Contact Center Model**

**Version 2**

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This White Paper explores the business benefits, operational models, and enabling technologies for the multi-site contact center. Although the dominant 1990's multi-site contact center technology model served enterprises well, the assumptions behind that model are now obsolete. The new realities drive a new multi-site paradigm that is flat, consolidated, and extended.

This new architecture enables new models for running contact centers that dramatically reduce costs and improve responsiveness to marketplace changes.

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## Introduction

Deriving business value from operating a contact center is very challenging. Numerous studies by industry analysts have identified the two most significant cost drivers as people (salaries, benefits) and telecommunications (trunking, 800 charges). These two expenses make up between 80-90% of the total cost structure of running a contact center, and these costs are magnified when running a multi-site center. Not surprisingly, organizations have been keen to implement multi-site optimization technologies to help minimize those two line items by invoking centralized management and accessing lower cost labor pools.

The purpose of this white paper is to examine the three-tiered multi-site contact center technology model of the 1990s, identify the drivers, environment, and assumptions for the three-tiered model, and suggest a new alternative that is consistent with today's operating and technological realities. The themes for the new model are Flat, Consolidated, and Extended.

This new alternative offers a low cost and vastly simplified infrastructure, improved operating performance, and enhanced organizational agility and flexibility. In many instances, the new model can be implemented with a payback of less than twelve months<sup>1</sup>.

## Multi-site Contact Center Background

One of the key issues for contact center operational managers and contact center technologists has been resource optimization. These managers have correctly pursued a model where all agents in an enterprise are utilized as a single pool of resources. This pooling of resources offers both efficiency and effectiveness gains.

Agent pooling positively impacts contact center efficiency metrics:

- Service Level attainment increases
- Average Speed of Answer decreases
- Agent Occupancy increases
- Maximum Time in Queue decreases
- Trunking Utilization decreases

These gains are primarily realized by the straightforward application of Erlang C traffic theory<sup>1</sup>.

Pooling can also help improve a contact center's effectiveness. Effectiveness metric impact includes:

- Caller Abandon Rate decreases
- Match Rate between caller need and primary agent skill increases

The effectiveness measures correlate with fewer transfers, higher first call resolution, higher customer retention, and improved cross selling and up selling.

This pooling concept among multiple contact centers is sometimes referred to as virtualization. Although the naming may vary, the desired end game remains the same: be efficient and effective with agent and telecommunications assets.

Given the benefits of pooling, the question then becomes: What are the contact center technology enablers for agent pooling or agent virtualization?

<sup>1</sup> Results are highly dependent on individual operating environments. Different implementation methodologies, assumptions, processes, and objectives may contribute to lower or higher results.

## The 1990s Multi-site Answer: The Three-Tier Model

During the 1990s, many organizations implemented a three-tiered routing model to implement the agent pooling principle. Three distinct technology layers were required:

- Layer 1: Service Provider (SP) with advanced 800 number routing features
- Layer 2: Computer Telephony Integration (CTI) based Network Router
- Layer 3: Standalone Automatic Call Distributors (ACD)

Many organizations followed this model as part of their “Best of Breed” technology sourcing strategy. With this approach, the enterprise chose the best product or service for each layer from a different vendor. The internal IT staff or a System Integrator then attempted to integrate the disparate components into a single system.

### 1. Technology Operating Description of the Three-Tier Model

After a caller dials an 800 number, the 800 service provider network temporarily puts the caller on hold. The service provider network queries the CTI based Network Routing application (usually premise based) via a special Signaling System 7 (SS7) based circuit. A component within this routing application, the Network Router, instructs the 800 service provider to send the caller to a specific application group on a specific ACD over a specific trunk group.

The Network Router application receives state change updates via the CTI link of each standalone ACD, a Network Router Interface, and in some applications, a real time reporting interface from the ACD contact center reporting system. These components forward real time event data on applications, routing routines, queuing conditions, skills, and agent work states to the Network Router. Via these updates of contact center conditions, the Network Router theoretically has visibility into agent groups across the enterprise. With this visibility, the Network Router can route to the right agent group on the right ACD on a call-by-call basis.

Once the call arrives at a site on a specified trunk group, the ACD routing logic takes over. The caller is sent to a specific agent group or groups. If no agent is available, the ACD queuing logic plays announcements, music in queue, or offers a self-service application.

If the caller is not answered in a user specified amount of time, and if the wait time is improved at another location, the Network Router instructs the ACD to send the call to a different location. Usually the ACD invokes a network service provider based “take back and transfer” to the alternate contact center site, and the call selection and agent selection process restarts.

At each location, there is significant contact center application infrastructure. Besides an ACD with its own voicemail system, a separate PBX is required to support the administrative (*i.e.*, non-contact center) workers; this PBX typically has its own voice mail system. Both the PBX and the ACD may require redundant dedicated 800/long distance, local service, and direct inward dial (DID) trunking. Additionally, each ACD has a dedicated Network Router Interface (possibly two if deployed in a high availability configuration) to forward events to the Network Router. Usually, there are also several adjunct applications located at each site as well: Computer Telephony Integration (CTI) systems or servers, Quality Monitoring, Interactive Voice Response (IVR), Workforce Management (WFM), Reporting, and Multimedia applications such as email, chat and web collaboration.

The application architecture for a four-contact center site deployment is depicted in Figure 1:

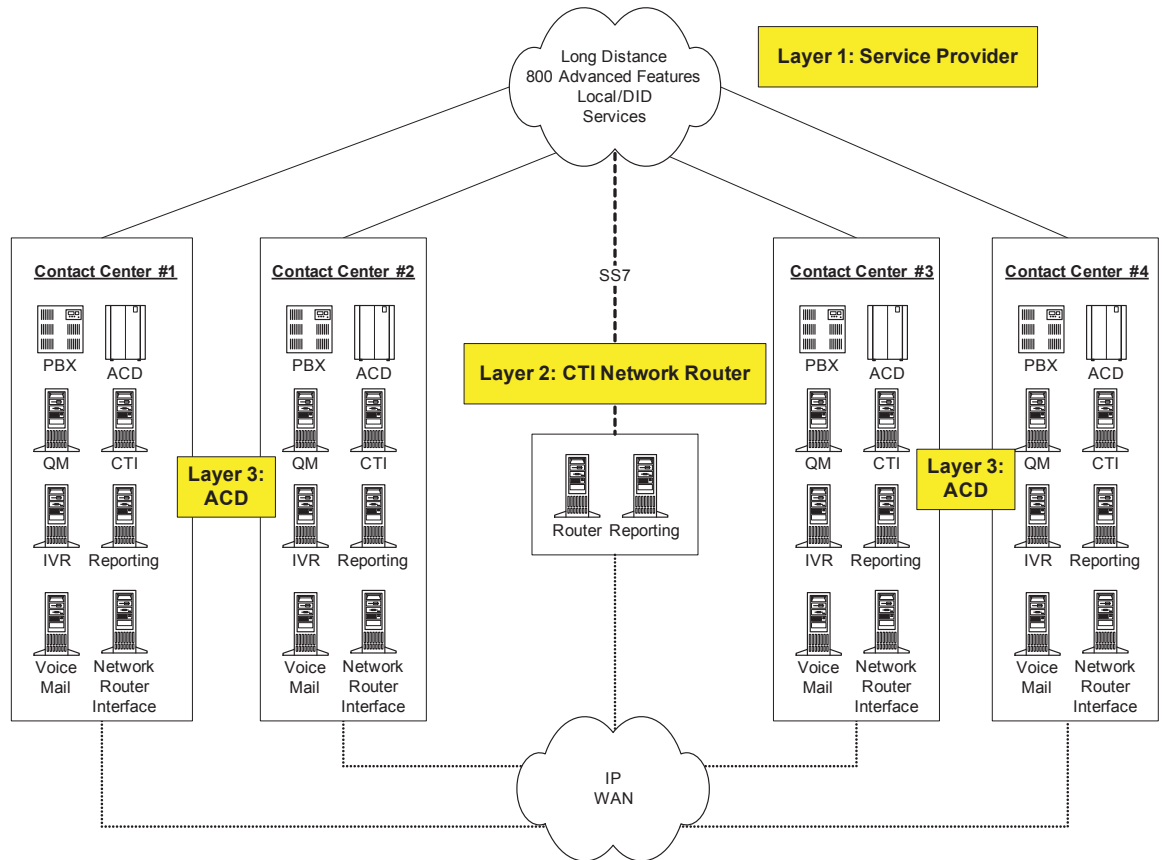


Figure 1 Three-tier routing model in a four Contact Center deployment

A variation of the three-tier model is used in industries (such as Financial Services) that garner very high self-service rates with Interactive Voice Response option. With this deployment model, the 800 Service Provider initially sends 100% of the calls to a centralized Interactive Voice Response (IVR) server farm; the individual IVR units are directly connected to the Service Provider network. The Network Router monitors the IVR ports with a Network Router Interface software process while concurrently monitoring the ACDs for agent and skill availability. If a caller is unable to self-serve and requests agent assistance (“zero out” option), the Network Router instructs the IVR to invoke a service provider based transfer. The IVR sends a series of touch-tones to the 800 service provider, and the service provider then reroutes the caller to the designated contact center.

The centralized IVR farm application concept is depicted in Figure 2:

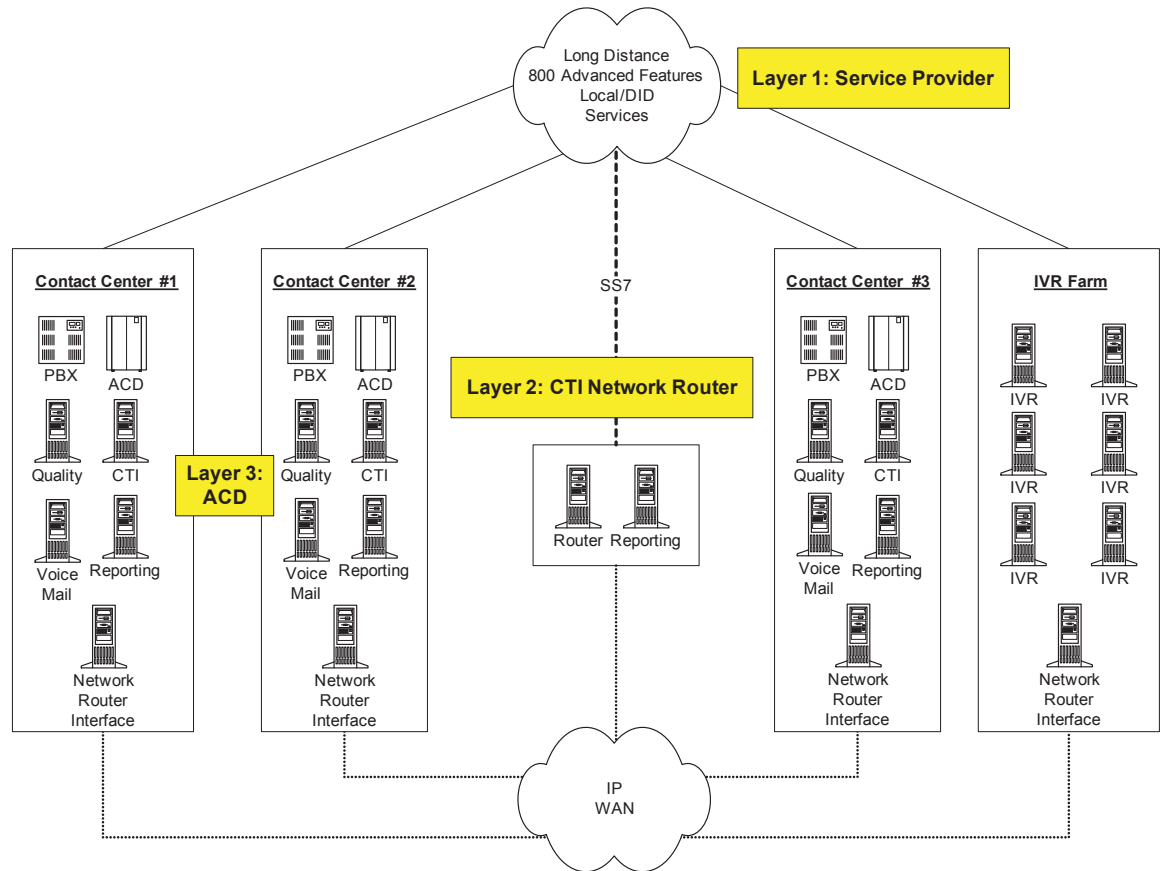


Figure 2: Three-tiered model in a three Contact Center and centralized IVR Farm deployment

In summary, there are three layers of logic operating in this multi-site model: The network (receiving destination and transfer instructions), the CTI based Network Router (sending the network routing destinations), and finally, the ACD (for the agent group routing, queue treatment, agent selection logic, and contact selection logic).

## 2. 1990s Rationale for the Three-Tiered Model

During the 1990s, the underlying technological enablers, service provider costs, and contact center operational models made the three-tier, best of breed model the superior option for many organizations. Drivers for the three-tier model included:

### Expensive base 800 charges

In the early 1990s, Fortune 500 companies with large volume commitments and long-term contracts typically incurred base 800 service charges of 12-15 cents per minute. Due to this high per minute expense, it was critical for companies to route calls to the correct contact center initially and avoid subsequent call transfers. If a call did need to be interflowed between centers using the ACD's routing logic, the 800 meter charges would double for the call: one charge for the initial call, and a second charge for the outflow call. For example, a ten minute interflowed call, at 15 cents per minute, equated to three dollars (2 calls X 15 cents/minute x 10 minutes). Given the labor rates of the 1990s, the 800 charges essentially equate to the cost of labor for that interaction (\$18/hour = \$3/10 minute call). As a result, the Three-Tier model was adopted to minimize these telecommunications costs.

### **Relatively inexpensive advanced service provider feature costs**

During the 1990s, Service Provider based advanced features such as SS7 dips, network prompts, announcements, and take back and transfers were typically invoked at \$.03 to \$.07 per feature. The costs of invoking these advanced features, although incremental, were justified when compared to the opportunity cost of an interflowed call. For example, if a SS7 dip and a Take Back and Transfer were invoked at 7 cents per feature per call, and the base 800 rate was 15 cents per minute, and a call lasted 10 minutes, then the total telecommunications cost for the call were \$1.64 ( $$.07 + $.07 + 10 \text{ minutes} \times \$.15$ ). Compared to the two legs of a 10 minute interflowed call, there is a cost advantage of \$1.36/call ( $10 \text{ minutes} \times 2 \text{ calls} \times \$.15 - \$1.64$ ) with the three-tier model. The cost for interflowing a call is higher within the first minute than the cost of using advanced network features.

### **Software based integration was the only enabler for multi-site operations**

Many companies grew via the accelerated mergers and acquisitions during the 1990s. As a result, many firms ended up with a heterogeneous mix of ACD platforms. The only practical way to pool the agent resources across multi-vendor ACDs was to normalize the operations via the CTI based Network Router. The only other option required total replacement of the existing ACDs and implementing a single enterprise platform, as there was no industry standard for native ACD multi-site routing. Because accelerated asset write down was unacceptable, the default solution encompassed CTI based Network Routing software, APIs, toolkits, and system integration service.

### **Time Division Multiplexed (TDM) based T1 was the dominant voice transmission technology**

Even if a company had ACDs from the same manufacturer, a private network of ACDs interconnected by point-to-point T1s became very impractical after networking four or more sites. These circuits tended to be very expensive, and they had to be deployed in a fully meshed manner (i.e. every ACD had to be connected to every other ACD). This ACD meshing caused significant reengineering, rebalancing, administration, and hardware additions when a new center was added or when an existing center experienced growth.

### **Outsourcer Management and Integration**

The Network Router based approach was a very practical way for an enterprise to blend agents from multiple outsourcers with their own agents in their in-house contact centers. The Three-Tier approach allowed for the benefits of agent and resource virtualization across partnered businesses. This allowed enterprises to piece off the variable work volumes, entire functional areas, and 2<sup>nd</sup> and 3<sup>rd</sup> shift work to the outsourcers, while keeping some core functions internal.

### **The standalone ACD was the superior contact center platform**

Standalone ACDs had exceptional routing and reporting capabilities when compared to PBXs. In addition to 100% contact center focused R&D and Product Management, ACD vendors had highly trained, contact center literate personnel working in Sales, Marketing, and Service, helping them to differentiate their offerings vis-à-vis PBX manufacturers. ACDs were truly the Best of Breed contact center technology for routing, queuing, and reporting on customer contacts.

### **ACD technology had limited scale**

Because of the limited power of early 1990s CPUs, many ACDs ran out of call processing power when 400 agents were simultaneously logged in and the call volume reached 10,000 calls per hour. CTI based Network Router applications were needed to manage multi-site routing because the ACD Central Processing Units (CPUs) ran out of processing cycles to effectively use their native multi-site routing logic.

### **Contact center technology infrastructure and workspace location were co-located**

Contact centers were a building where people physically reported to work. An agent had to travel to the place where all the technological tools and resources resided.

### **Contact centers were staffed locally**

Contact centers primarily sourced their agent talent from the local geographies within their home countries.

In summary, the three-tier, best-of-breed approach was created by the technological enablers and economics of the 1990s. Expensive 800 service, relatively inexpensive advanced 800 features, software-only integration techniques, TDM limitations, outsourcer management, superior functionality in dedicated ACDs, limited ACD scale, co-location of contact centers in physical locations, and the need for local staffing justified the business case and the technology selection for the three-tier, best-of-breed multi-site contact center model.

## **A Changing Environment**

### **Environmental and Technological Drivers in the New Millennium**

The three-tier, best-of-breed model was right for the 1990s. However, in 2005, the technological drivers, operating assumptions, and environmental factors that inspired the 1990s three-tier model are no longer valid. Paradoxically, what was once viewed as the best multi-site contact center technology model is now seen as an inhibitor to world class contact center performance, lean technology management, and profitability.

In 2005, the drivers and factors are markedly different from the 1990s:

### **Base 800 charges are now close to one cent per minute**

Because of continued reform and rigorous competition in the United States telecommunications markets, 800 service providers will start negotiations for 800 services at less than two cents per minute, even for medium and small size businesses. Using the same call flow as the 15 cent per minute scenario from the 1990s, the cost for a ten minute two legged interflowed call in 2005 is now as low as 20 cents. This same call cost \$3.00 in the 1990s. "Paying for the second call" was 15 times more expensive in the 1990s compared to today's costs. Deflation in switched telecommunications costs has forever altered the multi-site contact center operating model.

### **Advanced network features are now relatively expensive**

Today, advanced 800 features like SS7 dips and take back and transfer functions can cost almost as much as the base 800 service. Using the same call duration numbers in our previous example; assume a 10 minute call at 1 cent per minute with two advanced features invoked per call, with each feature costing 4 cents per use. The total cost of the call is now 18 cents, with advanced features costs being equal to 80% of the basic 800 charge. The advanced 800 features, totaling 8 cents, now make up 44% of the total telecommunications cost of the call. On a relative basis, advanced features are now 400% more expensive compared to the previous decade, when similar advanced feature charges were approximately 9% of the total communications cost of a call. At 8 cents per call, medium size contact centers can easily spend multiples of thousands of dollars monthly on advanced network function. Large call centers, handling over a million calls per month, can see advanced feature charges exceeding one hundred thousand dollars per month.

These advanced features are now a large enough line item to be managed as a separate expense item.

### **IP Telephony emerges as mainstream multi-site contact center technology**

During the 1990s, a new agent seat in a pooled contact center environment cost *thousands* of dollars. This per seat charge was comprised of software right to use fees, system integration efforts, and redundant hardware and network infrastructure. Today, that same contact center seat can be pooled for *hundreds* of dollars. The savings come from implementing a common IP network, centralizing contact center application software and servers, and deploying low cost IP phones and gateways. Complex, unmanageable, and least common denominator contact center functionality via CTI Network Router integrations clearly have become a second best alternative.

Voice traffic now rides the same enterprise network as other data applications, eliminating or minimizing the need for the CTI based Network Router application as well as the expense of advanced 800 features, dip charges, SS7 links, and network transfer charges. Through the late-1990s, dozens of network service providers installed thousands of miles of new fiber optic cabling and advanced electronics; these service providers are now luring new customers and incremental traffic onto their new infrastructures with extremely low cost IP offerings.

IP based voice communications is also useful for general Enterprise Telephony users. Non contact center business functions like sales, field service, marketing, finance, general management and administration, human resources, and logistics can now get universal access to centralized, productivity based applications like call coverage and centralized attendant service, messaging, mobility, conferencing, collaboration, and unified communications.

### **Integrated ACD/PBXs have world class contact center functionality**

Integrated ACD/PBX vendors have closed the feature/functionality gap with standalone ACD vendors. Some integrated ACD/PBX vendors have achieved a functional parity with the ACD providers, while a select few have platforms that offer truly superior functionality. An integrated ACD/PBX removes the redundant investment, administrative interfaces, maintenance, and infrastructure required in last decade's solution. There is no longer an artificial boundary between contact center and general telephony environments. All routing, prompting, queue treatment, trunking, call control, and agent states are controlled through a single application of organically grown software, with a single administrative interface. This is a radical simplification of the 1990s model.

### **Integrated ACD/PBX technology has massive scale**

Due to advancement in CPU processing power, a single integrated ACD/PBX can now connect thousands of callers to thousands of agents over thousands of trunks – all over the globe. Since the 1990s, Moore's Law has helped lift busy hour call completion rates from thousands of calls per hour to hundreds of thousands of calls per hour. This call processing logic can literally be distributed globally, and an enterprise can distribute calls over circuit switched, ATM, and IP based networks.

### **Contact center technology location and contact center work location are separate entities**

Fast packet technology, data centers, application service provider model, and centralized telecommunications technology management techniques allow separation of contact center technology and contact center work location.

National, regional, branch, small office, and home office based agents, as well as telecommuting agents, obtain contact center technology services over the Wide Area Network (WAN). Agents and infrastructure can literally be located halfway around the world from each other; many contact center work locations can be supported by a single technology infrastructure. Many companies have, or are installing high speed Quality of Service (QOS) enabled networks to support global operations, and the dramatic rise in Multi-Protocol Enabled Switching (MPLS) as an IP-VPN has set the stage for dramatically more cost effective enterprise networking. Contact center applications effectively become another networked enterprise application like email, ERP, and CRM.

### Outsourcer Integration

Outsourcers are now managed and integrated into an organization by extending low cost IP endpoints to the outsourcer location. This action keeps the work assignment, call routing, reporting, service observing, quality management, and work-force scheduling tools in house, allowing the organization to retain operational visibility into the outsourcer. IP telephony changes the outsourcing relationship by enabling a “My Technology – Your People” as opposed to the 1990s approach of “Your Technology – Your People”. This new model improves managerial control, raises negotiating leverage, and lowers the cost per seat.

### Contact centers staff globally

Contact centers now source their talent from around the world. Emerging markets like India, the Philippines, China, Africa, the Caribbean, Latin America and South America have an abundance of recent college graduates who are motivated, English speaking, highly skilled, and for whom contact center work is a solid middle class career. These countries typically offer 30% operating cost reductions over the US, Western Europe, and Japan, while offering a well educated, motivated, multi-lingual, and high quality workforce. The best agent for a particular caller can literally be chosen from around the world. The enabler for this operation is to simply extend an IP network and IP agent phones to those new global locations.

In summary, there are major differences between the technology drivers, enablers, and business environment when comparing the multi-site contact center of the 1990s and today. The following table summarizes the major differences between the two eras.

Technology Enablers and Drivers		
Enablers and Drivers	1990s	2005
Base toll free charges	12-15 cents/minute	Approaching 1 cent/minute (and trending downwards)
Advanced 800 charges	Rounding Error < 10% of telcom cost/call	Significant Cost Driver ~ 50% of telcom cost/call (and trending upwards)
Multi-site Contact Center Integration Technology	Custom Software, APIs, and System Integration	Emergence of IP telephony, Standards based Network Integration
Main Contact Center Serving Vehicle	Standalone ACD	Integrated ACD/PBX
Contact Center Scalability	Low – 100s of agents 1000's of Busy Hour Call Completions	High – 1000s of agents 100,000's of Busy Hour Call Completions (and trending upwards)
Outsourcer Model	“Your Technology – Your People”	“My Technology – Your People”
Contact Center Concept	Physical Place to Work – bound by walls	Source for tools and enablers – bound by networks
Contact Center Staffing Model	Local and In Country	Global

Today's environmental realities, enablers, and drivers are very different from those that suggested the three-tier, best-of-breed model. Today's realities suggest a radical rethinking, and the suggested managerial actions are “Flatten, Consolidate, and Extend”. These actions not only change the architecture, but also enable totally new processes and business models.

## Today's New Multi-site Architecture

The drivers of low cost commodity 800 services, relatively high cost advanced 800 feature charges, the emergence of ubiquitous, high bandwidth, IP based WANs, massive scalability, and global operating models propel the key themes of the new multi-site contact center architecture: flat networks, server consolidation, and extended operations.

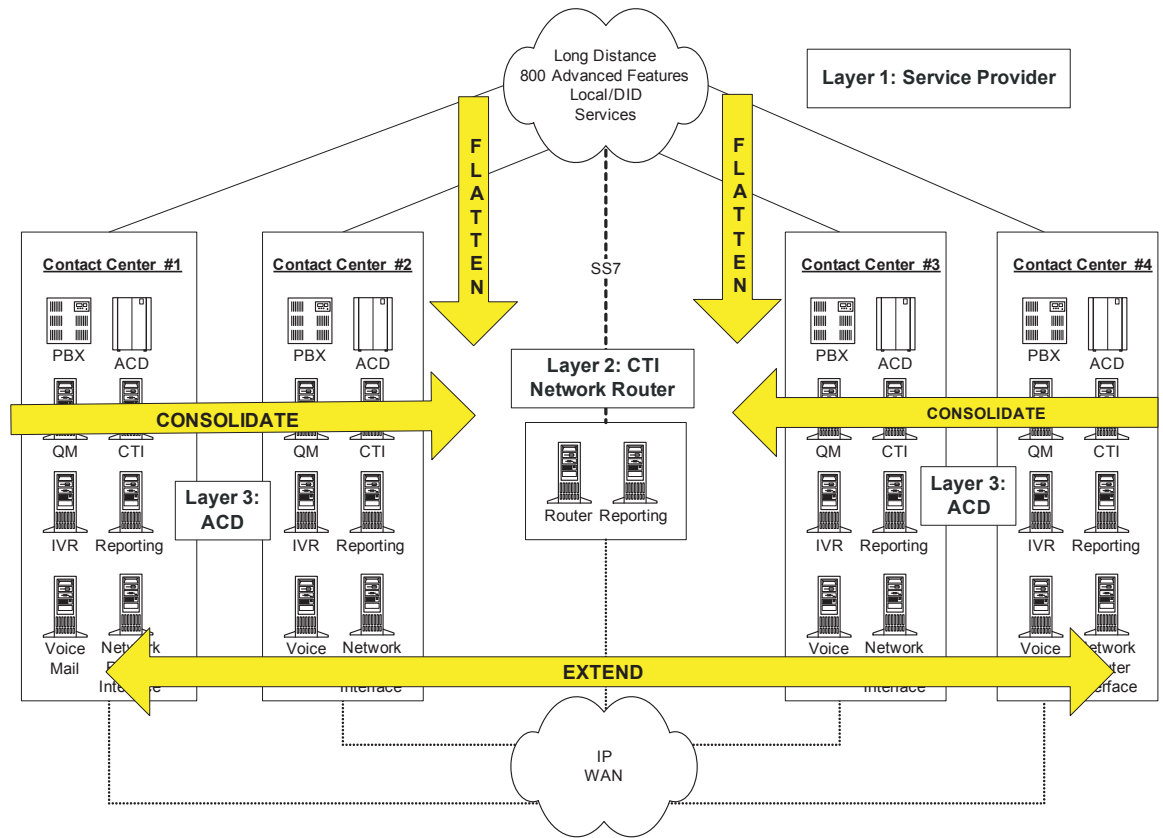


Figure 3: The forces of Flattening, Consolidating and Extending applied to the 1990s three-tier model

### 1. Flatten the three-tier network

Flattening the network occurs by compressing the three-tier model layers of hierarchal routing logic - 800 Service Provider, CTI based Network Router, and standalone ACD - into a single layer of routing and work distribution logic contained within a single contact center application. This application controls and has 100% visibility into all agent work states, skill groups, applications, 800 numbers, and trunk groups, as well as handling caller and queue treatment, selecting agents, and selecting calls from queue.

## **2. Consolidate Applications, Servers, and Management**

The single block of logic mentioned above not only controls the contact center, but also the core administrative users. It consolidates the separate ACD and PBX into a single integrated entity. Not only is this architecture simple and elegant, but also extremely flexible. Any telephone, in any location, can now become a contact center agent telephone. From a contact center management perspective, this allows contact center managers to operationalize new elastic and dynamic staffing models, as well as contact surge strategies because every end point in the organization is capable of handling calls. From a technology management perspective, this eliminates the need to manage two different inventories of telephony equipment, including servers, cabinets, circuit cards, and telephone sets.

The nature of IP networks allows for deploying an application once, and letting numerous users access the same application. The integrated ACD/PBX, CTI, IVR, Voice mail, Quality Management, Reporting, and Multimedia are all consolidated into a single application instance in a centralized location. Whether working in a 1000 seat center co-located with the applications, or working from a home office on the other side of the world, the consolidated applications are available to any authenticated user over an IP based network.

In summary, the reduction in servers is the result of three changes:

1. The CTI based Network Router is no longer required.
2. A discrete PBX is no longer required for each location.
3. Servers for supporting applications (WFMS, CTI, IVR, etc) are no longer required at each site.

Finally, distributed contact technology support personnel can be consolidated into a Center of Excellence. Centralizing the contact center technology management yields lower costs per unit, higher quality, and improved system security.

## **3. Extend Applications and Contact Center Operations**

Barriers of distance, country, and organization are eliminated with this new architecture. This architecture lets any agent, operating anywhere in the world, become part of the enterprise pool. The location may be in Headquarters, Regional Offices, Home Offices, Branch Offices, Small Offices, Home Offices, or Telecommuters. Agents can be in developed or industrialized countries, near shore, far shore, developing or emerging markets. Agents can be internal to the organization, part of a joint venture, or completely outsourced on the other side of the world.

This new contact center architecture is depicted in Figure 4:

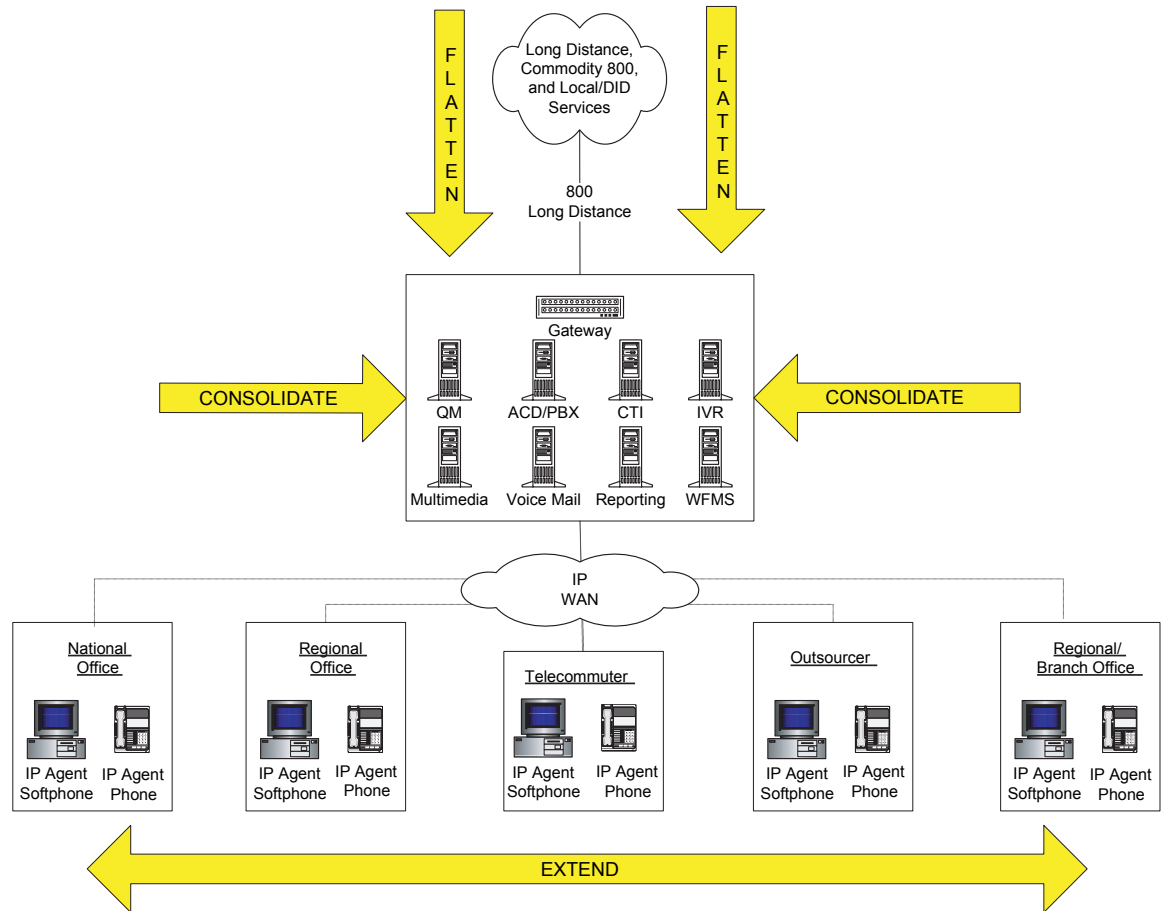


Figure 4: The forces of Flattening, Consolidating and Extending applied to the 1990s three-tier model

## The New Architecture: Technology Operations and Business Impact

The 800 service provider delivers calls to a simple series of centralized media gateways via very basic, low cost 800 services (with no required advanced features). The gateways are responsible for converting the originating TDM (circuit switched) based call into an IP (packet based) media stream. The gateways provide the additional supporting resources that a contact center needs: prompting for call purpose and caller identification, music in queue, announcements and on hold treatment. This gateway also serves as a connecting point for ancillary applications that require a voice stream or emulated voice stream such as fax servers, voice mail systems, IVR systems, quality applications, and overhead paging systems. The media gateway serves as the queuing or holding point until an agent becomes available.

The gateways, application routing tables, skill groups, call treatments, queue treatments, agent work states, call selection, and agent selection logic are controlled via an integrated ACD/PBX software based application resident on highly reliable and scalable media servers. This software executes on standard server technology; it is also the application source for administrative user applications such as call coverage, conferencing, messaging, mobility, and paging.

All 800 traffic and long distance can be centralized into one location. By centralizing this traffic into one location, the maximum trunking efficiency is gained - a straightforward application of Erlang B traffic theory. For the remote sites, gateways can be used to support a local market presence (i.e. telephone numbers in local Yellow Pages), Direct Inward Dial (DID), Central Office (CO) services, as well as 911 emergency services. These remote gateways also support TDM based

telephones for added resilience (for example, for continuity if the data network is impaired by a virus attack or a flapping circuit) as well as aiding in migrations (re-use of TDM telephones). The network design principle for the new architecture can be summarized as: “Centralize 800 and long distance facilities while distributing local presence facilities”.

Once the integrated ACD/PBX server selects an agent, the gateways use a digital signal processor (DSP) resource to convert the circuit switched call to an IP based media stream. The media stream is directed to the agent IP endpoint, and options for this endpoint include IP phones, IP soft phones, or IP based mobile devices such as personal digital assistants (PDAs). These agents can literally be located any place in the world. As long as the agent can log-in to the integrated ACD/PBX over an IP based network, the media stream containing the customer interaction will be directed to the correct endpoint, with end-to-end encryption of both the voice media and signaling streams.

It is worth noting that the integrated ACD/PBX is now literally an enterprise application. The application manages one single enterprise queue, with one set of business rules, one pool of agents, and one set of work states, all interconnected by a single, low cost, simple IP based Wide Area Network. Once at a site, the call is delivered over the switched LAN infrastructure to the agent endpoint.

Contrast the above philosophy with the 1990s model. The 1990s model makes a best guess at a contact center site coming from the network, and if the guess is wrong, reshuffles the call and queue deck again by rerouting the call to an alternative contact center, where the queuing, agent selection and call selection process restarts. The 1990s approach is horrendously inefficient and overcomplicated: multiple pieces of often conflicting logic touch the call multiple times. With the new model, there is no reshuffling of the deck: the caller is simply delivered to a centralized gateway site, and the enterprise ACD software makes one of two enterprise decisions: If there is an enterprise queue, what is the correct call to select from queue when an agent becomes available, or if multiple agents are available, who is the right agent to select. There is only one decision to make once, and there is no reshuffling of the deck of calls.

This new model also highlights the “Death of Routing”. Routing implies moving the call to different physical places and to different agent resources. In the new model, calls are delivered to a centralized location, caller identity and intent are established, caller entitlement is determined, and the call is assigned to the human resource best able to complete the work.

In addition to the core ACD/PBX, all the supporting adjunct contact center applications such as CTI, WFMS, IVR, Voice Mail, Quality Management, and Multimedia are also consolidated and centralized. Today’s CIO’s are quite familiar with the benefits of server consolidation – since 2003; many research firms have continually identified server consolidation as a top 5 CIO initiative globally. The mantra of this design and management philosophy is “Build Once, Deploy Everywhere, and Manage Centrally”. Whether an agent is working in a 1,000 seat contact center at a corporate headquarters, working for an outsourcer, or telecommuting from home on the other side of the world, every agent has access to the same applications and tools, and managers have 100% visibility into agent and location activity.

Contrast this new model with last decade’s architecture. In comparison, the 1990s design is overcomplicated and needlessly expensive to maintain and manage. Three-tiers of logic and an application instance per location make no sense when the operating assumptions, technology drivers, and business issues have changed so dramatically. A data center is an ideal location to house the new application infrastructure because contact center operations have now become another enterprise application like email, ERP, and Supply Chain. Because all applications are centralized, the application support staff can also be centralized at the data center as well.

A technology comparison of last decade's three-tier multi-site contact center approach and today's model of "Flat, Consolidated, and Extended" is illustrated in the following table:

<b>Technology Comparison: The 1990's Versus Today</b>		
<b>Technology Characteristic</b>	<b>Three-Tier (1990s)</b>	<b>Flat, Consolidated, and Extended (2005)</b>
Integration effort	High – custom CTI software and APIs	Low – standard network protocols from TCP/IP suite
Voice Transport	Circuit Only	Circuit or Packet
Multi-site Functionality	Least Common Denominator, normalized across disparate platforms	Rich, robust and deep functionality across a single platform
Queuing	Multiple queuing points because of multiple standalone ACDs	True single queue operation on one integrated ACD/PBX
Application Model	Multi-site Routing	Work Assignment "Death of Routing"
Routing Layers	Three layers of complexity: Service Provider, CTI, and ACD	Single layer of elegance: Integrated ACD/PBX
Site Infrastructure	ACD and supporting applications at each site	Simple agent endpoints
Operational Consistency across the Enterprise	Inconsistent	Highly consistent
Reporting	Rationalize and consolidate 3 disparate layers of reports	One enterprise layer of reports
Support Model	Distributed in each site	Centralized at data center
Total Cost of Ownership	Relatively High	Relatively Low
Manageability	Brittle, Inflexible	Resilient, Flexible
Application Infrastructure	Server Proliferation	Server Consolidation
New Site Addition	Invest and Implement Again	Extend the existing applications
Network	Tiered, Hierarchical	Flat, Distributed
Telephone Sets	Agent Only	All Users
Upgrades	Expensive and time consuming	Cost effective and minimal time investment

In summary, the three-tier, best of breed architecture of the 1990s made sense given the operating environments and technological enablers that were available. In the new millennium, the operating environment and enablers have changed and evolved. Today's reality suggests a multi-site contact center technology model that is Flat, Consolidated, and Extended. This new infrastructure model is radically simpler, more secure, and yields a much lower total cost of ownership.

## High Capacity Options

For high capacity applications, two or more data center based application hubs can be deployed. A very simple, low cost 800-service provider allocation splits the call volume across the hubs. Load balancing software native to the integrated ACD/PBX makes agent and call selection decisions across the application hubs. The transmission of these load-balancing calls occurs over circuit switched or IP based facilities. The gateway in the hub that accepts the original inbound call physically provides the queuing and call treatment, even though the caller may be logically queued in the second ACD/PBX. Advanced analytical tools consolidate the reporting across the two hubs, and advanced system management tools manage the two hubs as one logical system.

This high capacity option is shown in Figure 5:

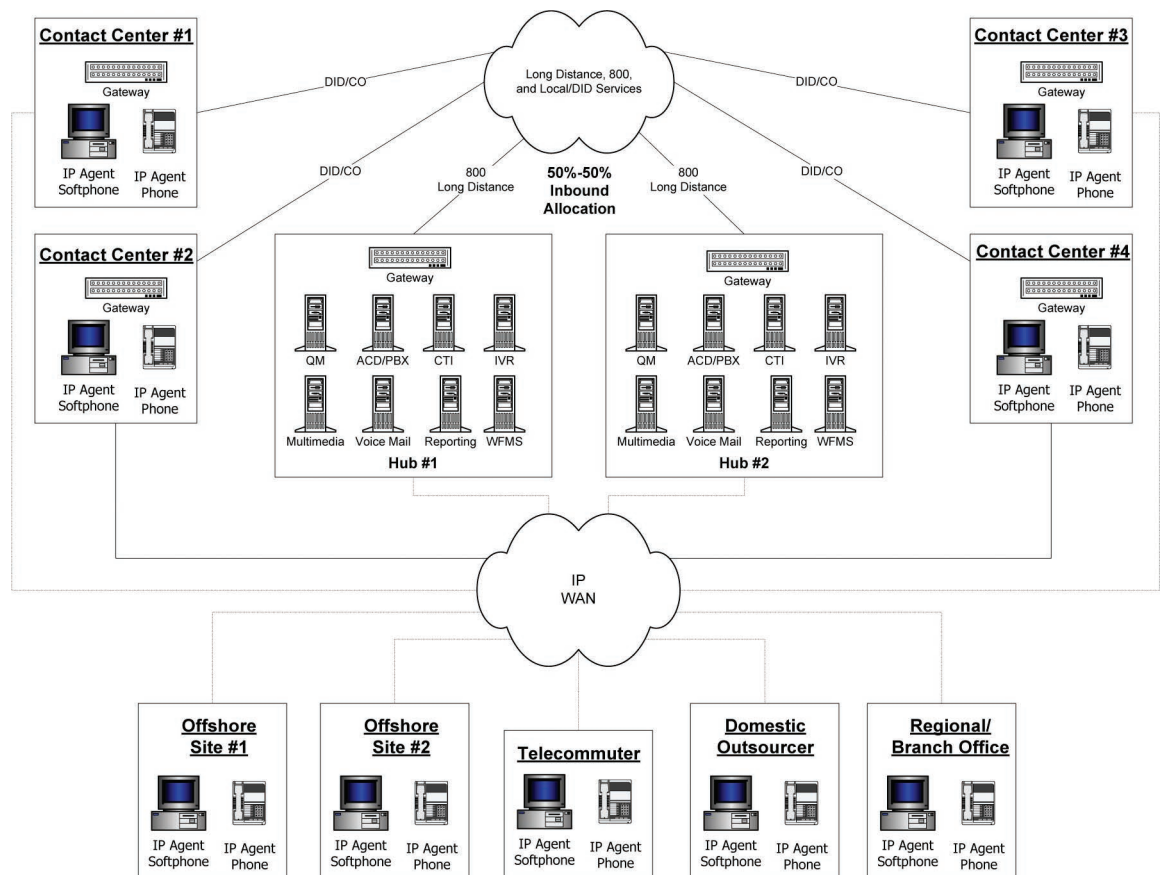


Figure 5: High capacity Flattened, Consolidated, and Extended model

## High Availability Options

The new multi-site contact center model has numerous options for high availability and business continuity.

The critical enabler to a Flattened, Consolidated, and Extended model is a highly resilient WAN design. Duplicated access links, dual service providers, redundant routers running in hot standby mode, and adaptive WAN path optimization software ensure uptime and excellent voice over packet performance.

A high availability best practice is to deploy the new architecture in at least two hubs. IP agent phones can re-register to back-up hubs in the event of signaling loss. This automatic re-registration can occur across multiple gatekeepers within a single hub, or across multiple gatekeepers in multiple hubs.

The gateways can be made survivable to help harden this architecture. Gateways can be designed to contain a standalone-processing complex. In the event of network or centralized site loss, the remote gateway becomes operable as a standalone ACD/PBX, providing the call processing function of the main ACD/PBX server. In addition, spare ACD/PBX call processing servers can be placed strategically around the WAN to automatically take over the contact center processing function in the event of application or network failure. Regardless of the placement of the standby-processing complex, the intent is the same: Deliver operational resiliency and business continuity. Used in conjunction with 800 number redirection services from a service provider, the spare processing servers and interspersed gateways aid an organization's disaster recovery planning.

Gateways can be configured to support a mix of TDM and IP based telephones. In the event of a data network impairment (i.e. virus, denial of service attacks), the TDM based devices continue to function.

800 and long distance service providers, central office access, points of presence, and building access points can all be diversified to increase operational resiliency and business continuity options. High availability design options are highlighted in Figure 6:

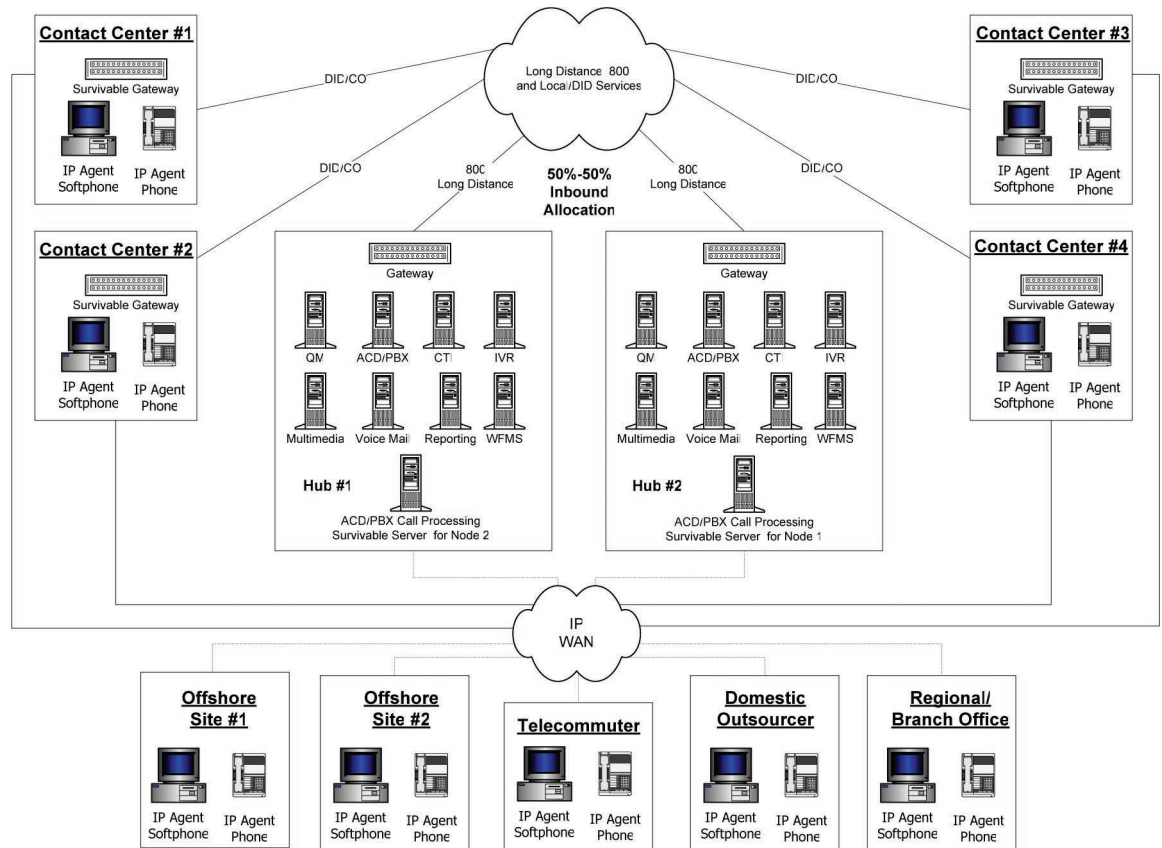


Figure 6: High Availability option in a Flattened, Consolidated and Extended model

## The Business Case and ROI

Migrating to today's flat, consolidated, and extended contact center model is frequently cost justified in less than twelve months<sup>2</sup>. The following sections highlight financial impacts to include in the business case and ROI analysis.

### Flattening the Three-Tier Network

By eliminating the CTI based Network Routing Application and the special Service Provider charges, cash flow can be recovered from the following activities and line items.

Service Provider related expenses and benefits:

- Signaling System 7 links
- SS7 dip charges
- Take back and transfer expenses
- Call prompting fees
- Delay Announcement expenses
- Base per minute 800 charge
- Service Provider "lock-in" prevention

Network Router application infrastructure costs and expenses:

- Network Routing application
- Network Router Reporting Application
- IVR Network Router interfaces
- ACD Network Router interfaces
- ACD reporting system Network Router interfaces
- Network Router maintenance
- Supporting infrastructure: operating systems, databases, and web servers
- Network Router upgrades
- Physical servers

Operations, Administration, Support, and Management expenses:

- Administration of the Network Router, reporting, monitored IVRs, and the monitored ACDs
- Maintenance and troubleshooting of the Network Router
- Upgrades to Network Router for security, bug fixes, vendor support, and functionality enhancements

## Consolidating applications, servers, and support

By consolidating applications and servers across multiple sites, using a server consolidation management philosophy, costs and expenses are reduced. Consolidation drives economies of scale in software and hardware acquisition, higher asset utilization, and lower support costs through centralized management and administration. Applications and infrastructure that should be considered for consolidation include:

- Standalone PBX
- PBX Voice Mail
- Standalone ACD
- ACD Voice Mail
- Quality Management System
- Call Logging Systems
- IVR
- CTI
- Predictive Dialers
- Reporting and Data Warehousing
- Workforce Management
- Multimedia (email, chat, and web interactions)
- Overhead paging
- Call Accounting

In addition to application and server consolidation, there are opportunities for trunking and application port consolidation. The economies of scale are derived from straightforward application of Erlang B theory. Potential areas for cost reductions include:

- 800 Trunking
- Call logging ports
- Quality Monitoring ports
- Voice Mail ports
- Predictive dialing ports
- IVR ports

For the applications listed above, look for capital and operational expense reduction in the following components:

- Physical servers
- Application software licensing
- Supporting software licensing: Operating Systems, Database Management Systems, and Web Servers
- Maintenance fees

<sup>2</sup> Results are highly dependant on individual operating environments. Different implementation methodologies, assumptions, processes, and objectives may contribute to lower or higher results.

For consolidated applications, technology management economies of scale are realized when a contact center technology center of excellence is developed. This centralized life cycle management philosophy includes savings from centralizing:

- Deployment
- Configuration
- Administration
- Maintenance
- Upgrade support

### **Extend applications and contact center operations**

By extending applications and operations over IP, the following hard dollar benefits accrue to a multi-site enterprise:

- Enable a worldwide single queue operation that provides the highest levels of agent occupancy.
- Integrate far shore, near shore, and outsourced contact center operations with in house centers. Far shore contact centers typically offer 30% cost savings, and near shore operations offer a 10% cost savings. Both shoring options improve quality while lowering costs.
- Prevent the stranding of assets when a contact center closes.
- Provide first class tools (call recording and predictive dialing) for work at home, telecommuting, small office, and branch based agents.
- Increase customer need - agent skill matching by removing barriers to optimal agent talent pools
- Improve the agility and flexibility of contact center operations
- Provide consistent process execution and customer experiences with one set of centrally managed business rules. This is especially valuable to companies that use a six sigma quality management philosophy.
- Improve the operational visibility into distributed contact center operations with one consistent set of reporting, quality management, and workforce management tools

### **Return On Investment Comparisons: IP Telephony Past and Present**

When IP telephony was in the early adoption phase, the original business case for VoIP in the contact center included lower costs of moves, adds, and changes, simplified wiring plants, toll charge avoidance, and the simplicity of running a converged network.

Five years later, experience shows that the most significant ROI contributors for IP Telephony in a contact center are coming from flattening networks, consolidating applications, servers, and support; and extending applications. These actions dramatically reduce service provider costs, radically simplify applications infrastructure and support, and drive economies of scale while increasing organizational agility.

The following chart illustrates the ROI relevance and magnitude differences of the legacy IP Telephony business case and the Flattened, Consolidated, and Extended model business case:

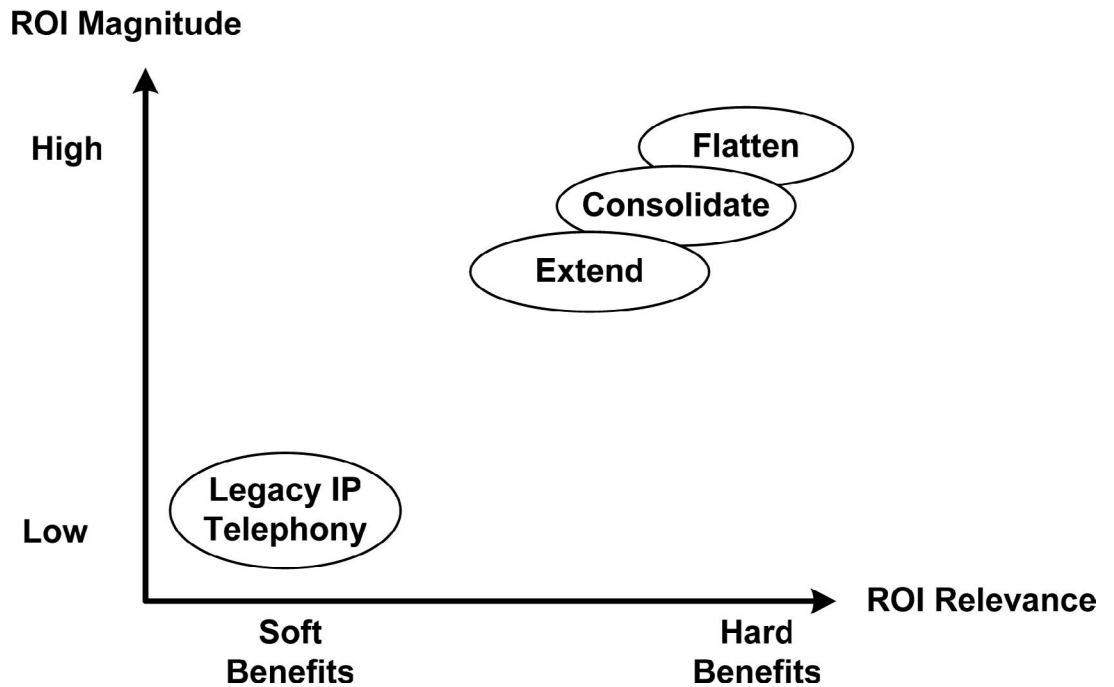


Figure 7: Return on Investment comparisons of legacy IP Telephony and the Flattened, Consolidated, and Extended model

### Avaya Differentiators

Avaya is uniquely positioned to execute on the new Flat, Consolidated, and Extended contact center model. Avaya differentiators include:

- Industry leading agent and contact selection criteria. The decisions based on these criteria govern the assignment of work; Avaya uses unique predictive technologies to make superior, business impacting decisions. A patented Avaya software module, Business Advocate, minimizes the effects of random contact arrival and random agent availability. This exclusive Avaya software manifests itself in improved match rate between customer segments and agent segments, reduced abandon rates, lower average speeds of answer, higher agent occupancy rates, and lower maximum delays.
- An extremely robust and reliable contact center feature set. A result of more than 25 years of organic software development, this application software offers over 700 features and is operational in the largest and most challenging production contact centers around the globe. The software code currently runs in more than 32,000 contact centers around the world.
- Massive scalability for the multi-site contact center provided by The Avaya integrated ACD/PBX, Avaya Communications Manager (ACM). A single ACM instance supports up to 5,200 agents, 8,000 trunks, 3,000 prompts and announcements, 12,000 queue positions, and up to 300,000 busy hour call completions.
- Simple, elegant application infrastructure. A single set of fully duplicated, call processing server appliances delivers full system scalability and preserves calls during failover. Additional call processing appliances can be strategically placed throughout a network to insure the highest level of call processing during network outages.
- Optimal WAN path selection. Advanced networking software proactively monitors IP networks and selects the optimal path through a network based on VoIP requirements for latency, jitter and packet loss. This software ensures the best path is taken at the beginning of each call, and proactively rescues calls in progress when network conditions degrade.
- Redundant prompts, announcements and queue treatment. Announcement and queue music sources are duplicated for high availability.

- Layer 7 call recording intelligence. Call recording, whether for quality management or record on demand, uses the native software based service observing capability of ACM. This elegant and simple approach contrasts with the administratively complex, bandwidth intensive, network sniffing approach of legacy IP telephony vendors.
- Highly secure application processing. The Avaya call processing complex can be completely isolated from the corporate LAN/WAN if desired, and IP phone conversations completely encrypted to prevent eavesdropping.
- Network agnostic architecture supports a range of configurations from 100% IP, 100% TDM, to any mix in between. The Avaya contact center philosophy is to define the problem, define the optimal solution, and then determine the appropriate network transport. Sometimes the decision is all IP, sometimes it remains TDM -most frequently it is a mix of both. It is only within the context of a larger contact center business problem that the transport technology has relevance.
- Global services. Services include application and network design, application integration, implementation, security, business continuity, maintenance, and design are available globally. Whether a customer chooses to work with Avaya Direct or a Business Partner, a complete suite of professional services is available to keep contact center solutions running at peak performance.

## Summary

Technology drivers were the validation for the three-tiered, best of breed approach during the 1990s. That design philosophy served a variety of organizations well during that time period.

However, new technologies and changing business drivers are leading organizations to transition to a flat, consolidated, and extended model. This new paradigm removes significant operating expense from an enterprise, vastly simplifies the application and network infrastructure, and facilitates new contact center operating models such as agent off shoring. These new architectures and operating models dramatically reduce costs and improve organizations responsiveness to marketplace changes.

## Learn More

For more information on how Avaya can take your enterprise from where it is to where it needs to be, contact your Avaya Client Executive or Authorized Avaya BusinessPartner, or visit us at [www.avaya.com](http://www.avaya.com)

## About Avaya

Avaya enables businesses to achieve superior results by designing, building and managing their communications infrastructure and solutions. For over one million businesses worldwide, including more than 90 percent of the FORTUNE 500®, Avaya's embedded solutions help businesses enhance value, improve productivity and create competitive advantage by allowing people to be more productive and create more intelligent processes that satisfy customers.

For businesses large and small, Avaya is a world leader in secure, reliable IP telephony systems, communications applications and full life-cycle services. Driving the convergence of embedded voice and data communications with business applications, Avaya is distinguished by its combination of comprehensive, world-class products and services. Avaya helps customers across the globe leverage existing and new networks to achieve superior business results.

# AVAYA

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