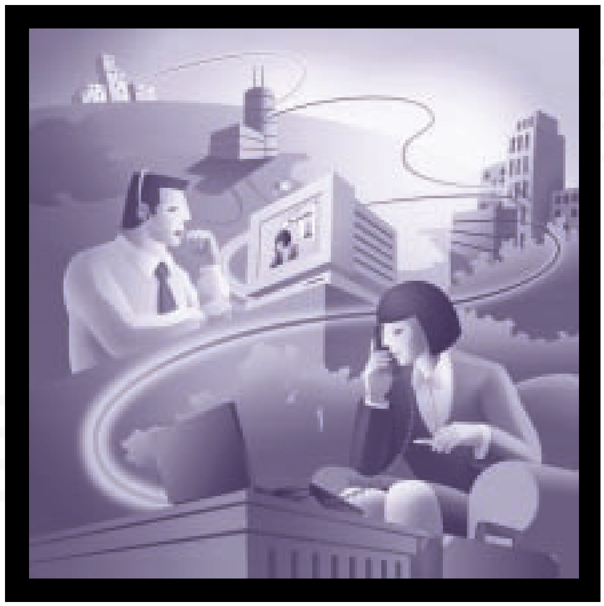


MultiService IP Telephony Business Case

Cisco Systems

Multiservice IP Telephony Business Case

Executive Summary

This business case provides senior managers responsible for defining the IT and networking directions of their companies the necessary supporting data and financial models to support effective decision making on the implementation of multiservice networking.

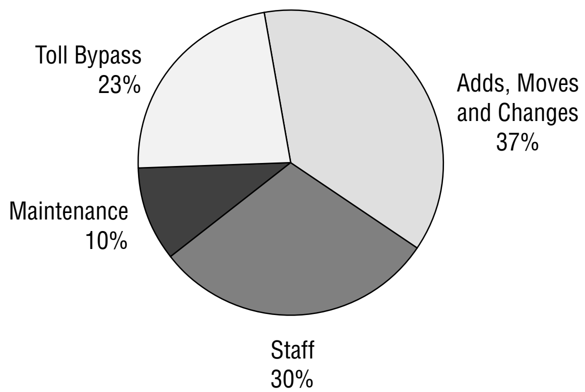
The term “multiservice networking” means the integrated support of data, voice, and video (DVV) business communications services by existing enterprise data networks. This support is ultimately intended to subsume over time the voice and video service delivery traditionally provided by the telephony network. Key technology enablers for these services are the associated voice-over-IP (VoIP) protocol suites and their supporting products.

The key drivers for multiservice networking are improved customer service, cost reduction, and competitive innovation. The multiservice application services that are discussed in this case include:

- Unified messaging
- Call centers
- Personal telephony
- Collaborative data sharing—Through use of utilities such as Microsoft’s NetMeeting
- Interactive and stored video

The business case illustrates the need for multiservice networking service implementation while at the same time traditional telephony services and legacy private branch exchange (PBX) products are reaching the twilight of their current architectural and product lifecycles. And, for those organizations with the vision to begin implementing a network service infrastructure today, a reduced operating cost structure is illustrated in two different return on investment (ROI) scenarios. This analysis shows a minimum of a 169 percent ROI generated over a three-year life-cycle period for a 100-user business location and a 136 percent ROI for a 1000-user campus location. Refer to Figure 1 for the breakdown of the 100-user cost savings.

Figure 1 100 User Cost Savings



The key conclusion is that while cost savings is arguably a benefit realized by implementing multiservice networking, the long-term substantial benefits come from the applications deployed providing operations optimization, ongoing product and service innovation, and continuing excellence in customer service.

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Key Business Success Factors

In his book "In Search of Excellence: Lessons from America's Best-Run Companies," Tom Peters concludes the following key business success factors: "In the private or public sector, in big business or small, we observe that there are only two ways to create and sustain superior performance over the long haul. First, take exceptional care of your customer via superior service and superior quality. Second, constantly innovate."

The latter point is particularly relevant in a competitive environment where rapid change is the only constant. Today's competitive strengths may be significantly reduced or rendered entirely moot by events that can occur within a matter of weeks, days, hours, or even minutes. These include the market entry of a new set of competitors, a recent company merger, an unexpected acquisition, or the passage of legislation that results in the lowering of one or more previously sacrosanct competitive barriers.

For most businesses, sustaining competitive advantage despite these events is becoming less a matter of internal grit and more a matter of the ability of the business to rapidly implement and deploy technology, information, or services. It is this mastery that enables the business to continually reinvent itself through, in the words of Peters, constant innovation.

One example of the rising importance of the need to prioritize in both of these areas comes from the future plans of the top 100 IT spenders in Europe. A recent survey of these plans shows that their key drivers at the moment are improved customer service (61 percent), cost reduction (58 percent), and competitive innovation (40 percent). By comparison, most other issues, including business reengineering and Year 2000 support, pale in comparison.

For many large, medium, and small businesses, one of the most significant issues is successfully leveraging new telephony and data services more quickly and effectively than the competition. Representative issues that many shops encounter include the inability to grow the in-house telephony system in order to keep pace with required business growth, outdated equipment that is simply unable to keep pace with more advanced requirements, lack of responsiveness from their current carrier or PBX vendor, and inefficient business communication that results from separate messaging systems for voice and data.

Effective communication, particularly communication that goes outside the company to key customers, suppliers, and business partners, has never been more important.

A supporting proof point lies in the results of a recent study performed by KPMG LLP. In this study, KPMG surveyed 225 vice president-level executives from the top 2000 consumer markets and financial services companies in the United States.

Two-thirds of the decision makers surveyed stated that they focus retail e-commerce strategies primarily on enhancing communications with and exposure to customers, rather than on sales and profitability. This illustrates that many businesses are becoming much more sophisticated about understanding true cause and effect relationships that have the most impact on business success.

Additionally, 29 percent considered increased name recognition and the ability to provide faster customer service as contributing factors to success. These results indicate that, like Peters, many decision makers are focusing on taking exceptional care of their customers via superior service and superior quality.

Related retail e-commerce research supports this assertion. This research shows that as much as 66 percent of existing e-shopping carts are abandoned before the related business transaction is completed. This rate could be reduced, and an attendant rise in revenue and profits could be achieved, if shoppers had access to a live agent during the course of making the transaction.

The need to overcome the functional and scalability limitations of the existing telephony system along with the increased business opportunity that can potentially be realized through successfully leveraging superior customer-service technology both point to the same conclusion. *The successful businesses of the future will be the ones who are the most successful in implementing network telephony services in order to create demonstrable competitive advantage.*

Another proven skill in successful decision making is the ability to identify the right stage in the life cycle of a strategy technology, at which the best benefits can be realized from the implementation of that technology, while at the same time incurring the least risk. This objective is no different when it comes to effective decision making regarding network telephony implementation.

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The characteristics of the early majority implementers as defined by Geoffrey Moore in the noted industry work "Crossing the Chasm" provide insight into the key hurdle metrics that need to be satisfied. The early majority are a set of users who:

- Want to purchase productivity improvement for existing operations
- Want to minimize discontinuity with previous approaches
- Want technology evolution versus revolution
- Want the associated product(s) to enhance, not overthrow, the established ways of doing business
- Don't want to debug someone else's product

Contrast these attributes with those of the early adopters who:

- Expect to get a jump on the competition through:
  - Reduced product pricing
  - Faster time to market
  - More complete customer service
  - Some other comparable business advantage
- Expect radical discontinuity between old ways and new, and will champion cause against entrenched resistance
- Prepare themselves to deal with bugs and glitches that come with early product releases

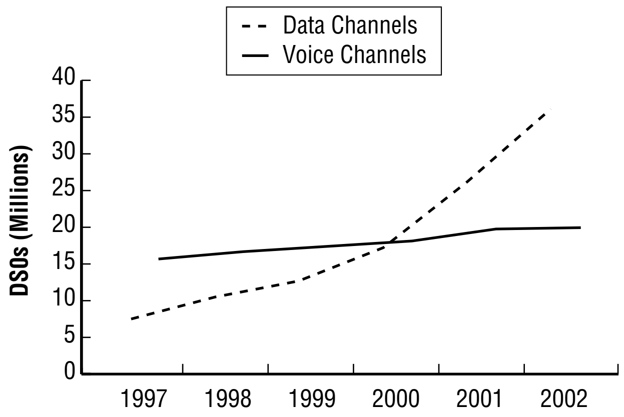
Industry findings support this assertion. A study conducted by AT&T in 1998 found that 88 percent of managers polled said it's crucial that IP services can be accessed by existing phones and fax machines. However, more than 75 percent of these same respondents said they needed systems that provided call detail data-specific enough to justify the expense undertaken in converting voice from circuit-switched services to network telephony. Oleh Danyluk, AT&T's general manager for next-generation IP services, commented on these findings that, "If you don't meet those expectations, you won't get through."

The Network Power Shift

Most industry experts agree that, because the annual growth rate of data-network traffic (between 60 and 80 percent for many users) is averaging nearly ten times the annual growth rate of voice traffic (between 7 and 9 percent), the total volume of global data traffic will exceed that of voice within the next 12 to 18 months.

Study results from industry watcher Dataquest support this assertion. In this study, the number of data versus voice DS0 channels across the globe was both historically tracked and projected based upon carrier forecasts. Results are shown in Figure 2. These projections show that the balance of traffic will dramatically shift within two years.

Figure 2 Current and Projected Data DSOs versus Voice DSOs



Source: Dataquest, 1999

At the same time that the balance of power is shifting in the public network, the maturation of the product architecture of the traditional PBX is also occurring to a significant extent.

Today it is estimated by the Gartner Group that approximately 30,000 systems, or 12 percent, of the installed base of PBX systems are now more than ten years old. In addition, according to Gartner, many of those systems need to be either totally replaced or significantly overhauled. By midyear 2000, the state of PBX product development will have shifted dramatically. At that point, many of the traditional PBX vendors will have shifted away from the classic architectures of the past and instead will more actively embrace value-added active interworking with a variety of server-based architectures and systems.

In October 1998, a significant event in the PBX industry occurred at NetWorld+Interop when two of the three largest PBX vendors, Lucent and Siemens, each announced new LAN-based PBX products at about the same time as industry leader Cisco Systems. All three vendors stated that their systems will currently support as many as 100-users, with plans to scale to 1000-users over the next 12 to 18 months.

This event is particularly noteworthy because the last major PBX architectural shift, the transition from analog to digital PBX architecture that began in the late 1970s, was a result of the major market leaders at the time (AT&T and Northern Telcom) deciding to endorse, rather than fight, the concept by introducing solutions of their own.

In light of these industry events, users are well advised to question more than ever their vendors' long-term architectural plans for today's current circuit-switch-based PBXs. In addition, users should also question their vendors' plans to deliver and install IP telephony and server-based solutions over the coming 12 to 18 months.

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Note that this does not mean the short-term end of circuit-switch-centric PBX products. It is likely that these products will continue to be delivered for at least five more years, but will be accompanied by a significant shift to support of IP telephony services.

This assertion is also supported by relevant industry data. According to the Yankee Group, 31 percent of the top 5000 telecom spenders in the United States have deployed voice or fax over data networks as part of initial evaluations of the technology.

Despite the fact that Internet service providers (ISPs), competitive local exchange carriers (CLECs), and others are currently undercutting establishment prices by 30 to 50 percent by charging five to seven cents per minute compared to 10 cents per minute, it is clear that "cheap minutes" and toll-rate arbitrage by themselves will not drive the long-term need for network telephony services.

If true customer-service excellence and delivery innovation are the prime objectives driving the implementation, it is clear that the base telephony service must be complemented by the deployment of one or more key application services that facilitate a more effective means of customer-service delivery, a more streamlined means of operating the business, or a combination of the two. Therefore, the implementation of network telephony is less of a box replacement proposition, but rather an infrastructure transition proposition.

Key Multiservice Telephony Applications

Background

Two important themes were established earlier. The first is that ongoing innovation, continuous excellence in customer service, and the ability to react quickly to unforeseen business or industry change are three critical success factors in maintaining competitive excellence. The second is that if a business can be successful in consistently achieving most or all the key success factors while minimizing both technical and business risk, it then achieves the best of all worlds.

Another point to be made is that it is not always a single benefit or application that drives a more effective means of doing business. It is the combination of new products and technologies that can constitute sufficient critical mass to drive the rationale for early majority implementation. The business benefits of multiservice networking stem from a convergence of factors, and most industry observers agree on the combination of these three key success factors:

- The implementation of a set of application services that collectively support a better way of conducting business
- The achievement of effective cost-of-ownership that occurs in tandem with new application service deployment
- The realization of sufficient application service stability that provides a credible basis for initial production deployment

But what are these key application services, and what are their associated cost-of-ownership implications? Part of the answer comes from significant industry research conducted jointly in 1998 by Renaissance Worldwide and the Metzler Group.

In this study, over 1200 network managers were asked to rate which key convergence applications would likely reach early mainstream status by the middle of 2000.

The applications and application services considered within this study are included in Table 1.

Table 1 Survey Results of Key Convergence Applications in the Year 2000

• Network telephony • Internet call waiting • Click-to-dial services • Unified messaging • Interactive collaboration (applications such as Microsoft NetMeeting, CUSeeMe) • Virtual worlds	• Interactive video streaming • Distance learning • Enhanced personal communications services • Interactive gaming • Portal television • Personal supervision and observation • Webcasting

The study concluded that network telephony, unified messaging, and interactive collaboration were among those services most likely to reach early majority status by the middle of the year 2000. While not explicitly addressed in the study, most industry observers and users also agreed that Call Center technology will become critically important to the success of both current and future e-commerce initiatives.

Call Centers

Call centers are sites where groups of skilled representatives or agents receive and answer incoming telephone calls, managing customer contact. Traditionally, call centers have used toll-free voice communications between a customer and a company's customer service, marketing, or technical support organization. The range of functionality supported by a call center ranges from five telephones with a PBX system to the use of more advanced telephony technologies such as interactive voice response (IVR), automatic call

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distribution (ACD), voice-mail system, facsimile server (where data could be transmitted through facsimile), and computer telephony (where inquiries could be received and responded to through computers).

In cases where moderate to complex product-ordering or technical-support requirements exist, any of these methods can easily result in frustration for both customer and customer service representative, because neither can see the other, nor can either see a model of what the customer is trying to order or the conditions that are causing product problems to occur.

In addition, customer frustration can occur when operating in self-help mode and not interacting with a customer service representative. Recall the previously cited research that shows that as much as 66 percent of existing e-shopping carts are abandoned before the related business transaction is completed, illustrating the fact that the other extreme, one in which customers take far greater control in managing their own product destiny, is often not a satisfactory solution either.

More businesses are now finding that a blending of the two, online call centers that make an increasing use of network-based telephony services, can often be a far more effective approach to the delivery of higher-quality customer service. The reason is that this class of implementation is increasingly able to support a greater extent of traditional telephony services but also supports means by which face-to-face interaction can occur, if needed, and text or graphical interchange can occur, if required.

Network Telephony

In the network-telephony model, the Web user begins a transaction at the company or institution Web site, but has the option of directly connecting to a customer service representative by using what is called "click-to-dial" functionality. The result can be an audio, video, or simultaneous audio and video interaction with a live customer service representative.

In this scenario, a mouse click on a hyperlink of the form Call Customer Service Representative enables the Web users to directly enter into a phone conversation with a customer service representative (CSR) who can supply them with the timely information necessary to correctly complete the required transaction(s). In order to address the issues of the lack of visual contact, many sites are now supporting a videoconferencing style of interaction so that the Web user can both hear and speak to the CSR. Examples of service user interfaces that support each style of interaction are provided in Figures 3 and 4.

Figure 3 Internet Audio-Enabled Call Center

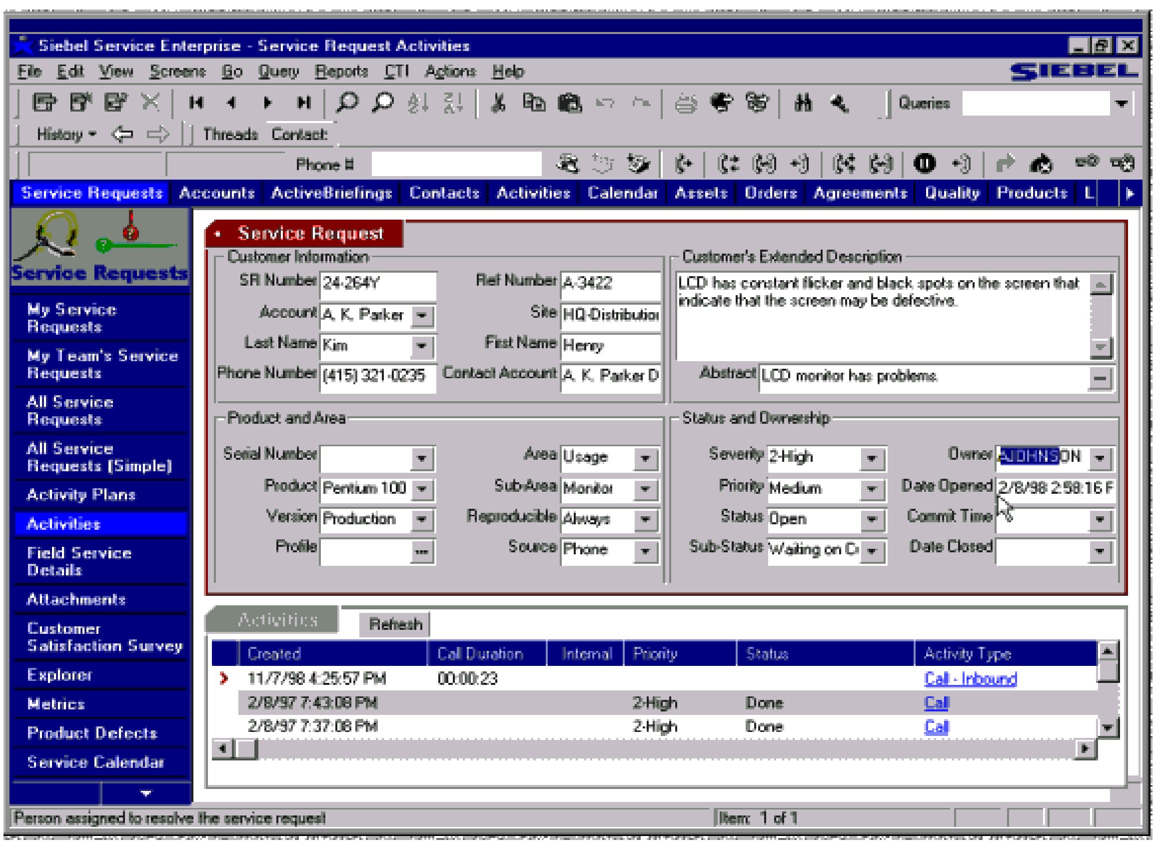

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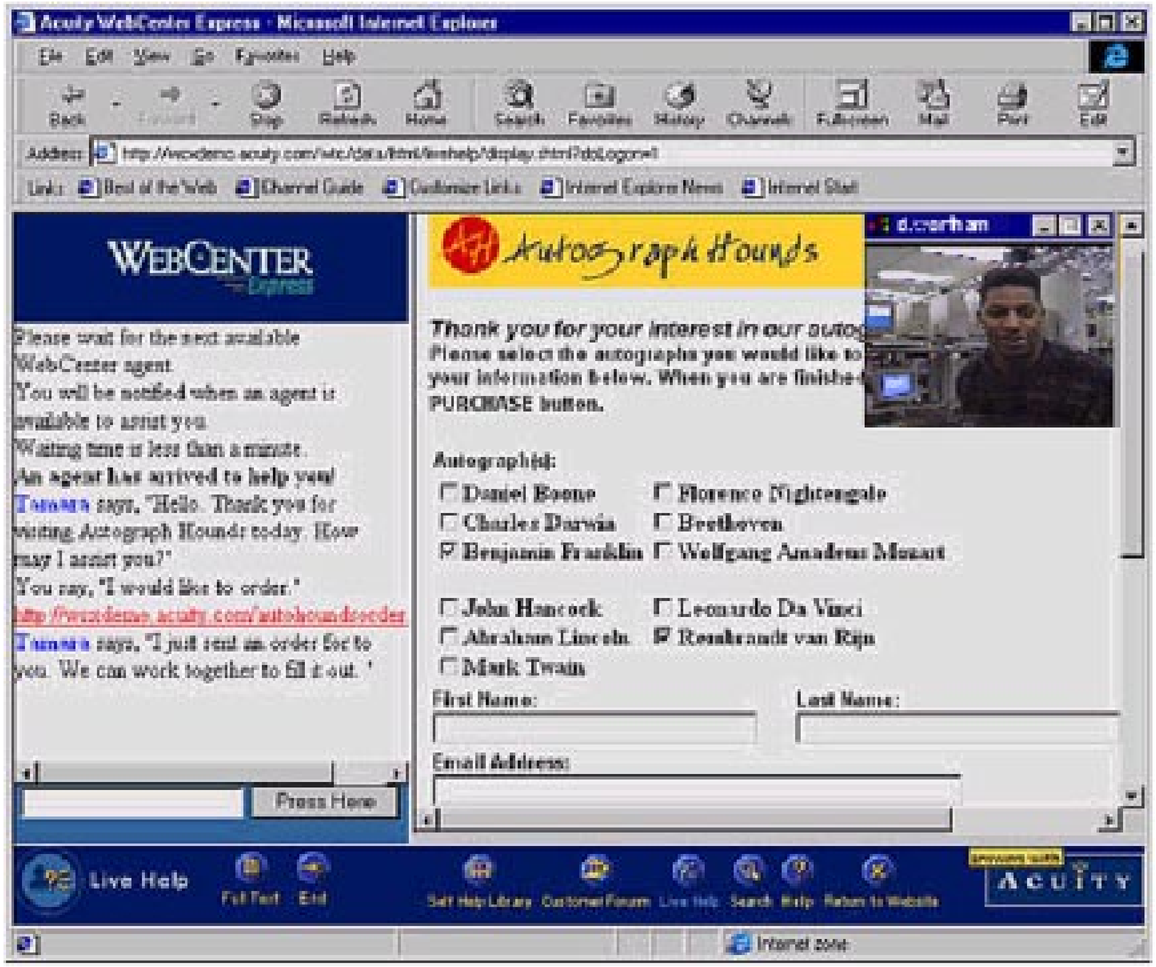
Figure 4 Internet Audio and Video-Enabled Call Center



Traditional call-center services have been in place for some time. The interest in Internet-based call centers that support user interfaces such as those shown in Figures 3 and 4 has been growing rapidly since 1996, driven by both increasing customer service quality demands as well as the increasing technical maturity of VoIP technology.

The longer-term implications are indeed significant. While today's worldwide revenue for traditional call-center services are estimated at approximately $20 billion, the revenue figure for network-based call-center services is expected to approach $2 billion within three years according to market watchers Frost & Sullivan and Ovum, Inc.

In addition, European analyst DataMonitor has predicted that the number of call centers in Europe will be 17,900 by 2003, with 3400 (or nearly 20 percent) of those expected to be Web integrated. Data Monitor also advises that ignoring the impact of the increase of online consumer's and new customer's access channels will be potentially disastrous for companies that fail to implement the associated technology in a timely way. This warning is yet another example of the increasingly close coupling between successful customer service and ongoing innovation that is rapidly evolving and is a critical success factor for short- as well as long-term business success.

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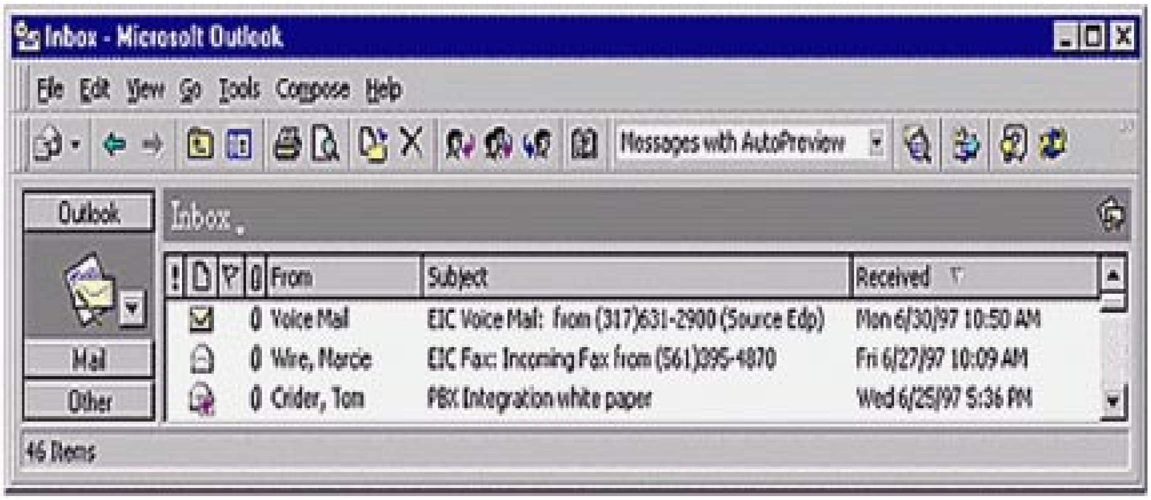
Figure 5 Universal In-Box Interface Example



Unified Messaging

Similar to call centers and call-center applications, unified messaging is generally regarded as a key member of the core set of applications that will justify initial multiservice telephony implementations. Unified messaging means having the ability to access and immediately respond to voice, fax, and e-mail messages from customers and coworkers, 24 hours a day, from any phone or PC within the extended enterprise. A sample universal inbox is shown in Figure 5.

The professional productivity advantages of a unified messaging system are significant. In contrast to today's voice, fax, and data-messaging systems in which message content has to be manually copied, scanned or otherwise transcribed in order to be passed between different system types, unified messaging offers a substantial productivity advantage. Through its support of a universal inbox that can contain varying amounts of all three types of messages, universal messaging substantially reduces, if not eliminates, the need for message copying between different media types, in addition to significantly reducing the probability of information errors that may result from manually copying content.

In addition to productivity, unified messaging also offers substantial message-access and transfer-flexibility advantages. As opposed to having only one class of access device per message type, unified messaging enables traditional handsets, PCs, and fax machines to be the access device of choice depending upon the access requirement and location of the user. The productivity gains realized through usage applications—such as listening to e-mail messages on a wireless phone while driving to the airport, re-directing a fax from an e-mail account to a hotel fax machine, listening to voice messages on a PC while dialed in to the company's network, or forwarding a voice message to anyone in the world with an e-mail account—are quite meaningful to most businesses.

Unified messaging can also enhance customer service and responsiveness because of the cycle-time reductions associated with whatever means the customer uses to communicate with the business. The customer contact issues that result from an increasing mobile workforce can be reduced by increasing the utility of mobile communication devices such as wireless phones and hand-held computers to support a richer degree of both business-to-business and business-to-customer communications.

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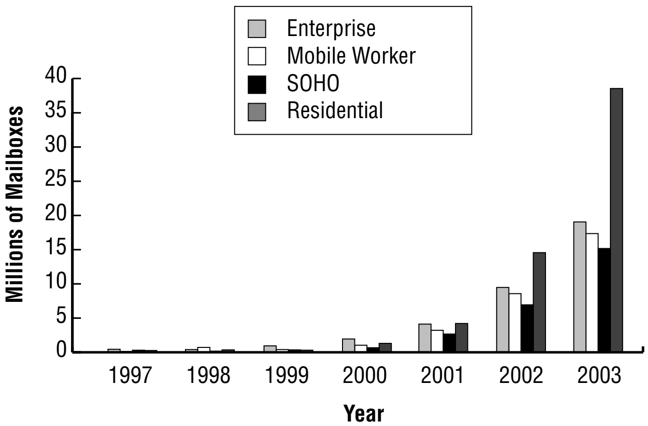
Recent market research also shows that unified messaging will enter the early-majority implementation phase by the latter half of the year 2000. Studies completed by Strategy Analytics show that the total number of unified messaging mailboxes for business and residential users will total five million and jump to approximately ten million by the end of 2001. The total market projection for the next five years is shown in Figure 6.

Figure 6 Unified Messaging Mailbox Forecast



Source: Strategy Analytics, 1999

In addition, market-watcher Frost and Sullivan projects that market revenue from public and private unified messaging services are expected to combine for nearly $550 million in revenue in 1999 and top $1 billion by the end of the year 2000.

A key assumption made in the formulation of these projections is that of the existence of one or more universal messaging platforms that are already in place on which unified-messaging services can be based. The good news is that most universal messaging products that are being announced and delivered today can be layered atop popular legacy messaging systems such as Microsoft Exchange or Outlook. This scenario gives many PC users access to new services through a command interface with which they are already familiar. In addition, given that unified messaging services are generally server based, many unified messaging products can easily support the equivalent of traditional voice-mail services through the server-to-PBX computer telephony integration (CTI) linkage, thus facilitating message access through another universal-message access mechanism: the wired or wireless telephone.

Interactive Collaboration

"If you build it, they will come." This time-proven statement applies to many situations. Here it applies to the implementation of collaborative applications within a multiservice telephony network. Collaborative applications are those applications and utilities that combine voice and video interaction with information sharing. Prominent product examples include Microsoft NetMeeting, White Pine Software's CUSeeMe Pro, and Macromedia's Shockwave Multiuser Server.

One of the most promising areas that multiservice collaborative capabilities can improve upon is knowledge management. Knowledge management goes beyond managing the information typically generated by executing transactions and the data available in structured databases to encompass the skills, expertise, and ongoing insights about management processes that are critical in shaping judgments and actions.

One of the key foundations for implementing effective knowledge management in many companies will be the ease of communication and information access simultaneously facilitated by multiservice collaborative applications whose operation is best supported by the telephony network.

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Business Case Analysis

Introduction

Part of any credible business case involves understanding and quantifying the costs and investment associated with the initiative in question. Recall that in the cited survey of the key business initiatives for the top 100 IT spenders in Europe, cost reduction was sandwiched between improved customer service and competitive innovation in terms of its importance. Therefore, the key objectives in this business case are to ensure that the multiservice telephony network implementation constitutes an environment that improves the competitiveness and operations efficiency of the business, reduces voice and data network operations costs, and improves the ability to service existing as well as new customers.

Up to this point in the business case, the main focus has been on the key drivers and industry trends that show the clear shift that is occurring between legacy and next-generation telephony services. In addition, more qualitative arguments have shown why beginning the implementation of the first phase of a multiservice telephony network during the course of the year 2000 may well result in the best mix of strong competitive advantage coupled with the required level of technology and product maturity.

A complete business case analysis that supports the key objectives of competitive advantage, cost reduction, and improved operations efficiency follows.

Cost Analysis Framework

Before beginning, a few key points are worth noting. First, in using cost-of-ownership data as part of a larger business case, it is important to recognize that current cost allocations and associated cost-per-desktop results are important parts of the total business case, but they are only parts.

Although cost reduction is one of the key business-case objectives, by no means is it the only one. In addition, there are two different kinds of costs: hard costs and soft costs. Hard-cost reduction results directly in reduced cash flow. Soft-cost reduction is the same as opportunity-cost reduction: the result is improved worker productivity through the reduction of prior overhead. Both need to be quantified when both reduced cost and improved operational efficiency are key business-case objectives.

One example of soft-cost reduction is illustrated by the use of a new time reporting system that reduces time reporting by one hour per week for each of 100 professionals. If the per-hour cost per professional is $45, then the total soft-cost benefit delivered by the new time reporting system is $45 x 100 professionals, or $4500 per week, an amount equal to 100 person-hours of improved productivity.

The other risk of many cost-of-ownership analyses is that they can be performed with only a single year context in mind. Experience shows that numerous investments, particularly those that enhance the ability of the business to sustain competitive innovation, may have an associated business case that shows some form of operating loss in the first year of execution but significant operating gains in subsequent years. It is important, therefore, to assess the entire investment scope with a multiyear analysis in mind. In this business case, a three-year analysis timetable is used.

Benefit Analysis Framework

Of the three key objectives stated at the beginning of this business case, two are directly benefit related: customer service improvement and the ability to sustain ongoing product and service innovation.

Often, the associated revenue impact may occur in many distinct product or service areas as a result of a single initiative. Similarly, there may be multiple initiatives that are in process simultaneously, each of which has its own set of incremental revenue benefits.

In order for a business case to be both accurate and comprehensive at the same time, it is necessary to ensure that all the possible benefits that could result from a given initiative investment are effectively quantified in some way.

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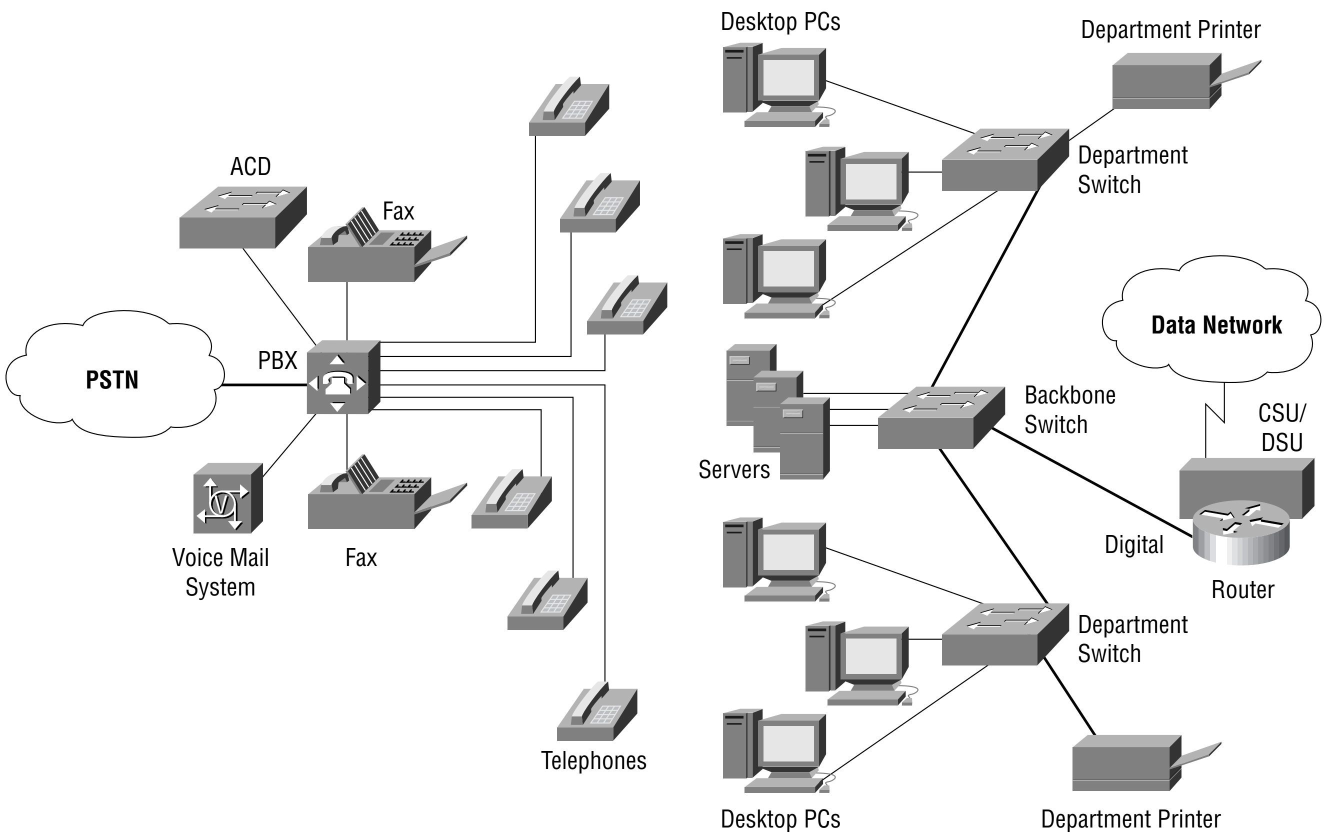
Figure 7 Reference Voice and Data Network



Business Case Calculations

This section gives the actual calculations used to define the multiservice telephony network business case. Two reference networks are used for the business-case analysis because they represent the most likely design centers that will be used by early-majority implementers. The structure of the reference network is shown in Figure 7. This reference network illustrates the topological structure corresponding to separate voice and data networks for two configurations: a 100-user configuration and an 800-user company who has a three year growth plan to expand to 1000-users, opening up two branch locations. The 100-user configuration is similar to that of a small or mid-sized branch office while the 1000-user configuration would be more germane to a large corporate environment. Each configuration is analyzed separately in the following subsections.

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The 100-User Configuration

Additional data that will be used in the body of this business case is the estimated industry-average per-desktop cost distribution of capital, support staff, and facilities for both voice and data networks, as well as the distribution of support time by major task for both data and voice support personnel. This data is based upon primary research and estimates supplied by Renaissance Worldwide and Gartner Group. The respective estimates for the data and voice networks are contained in Tables 2 and 3 respectively.

Table 2 Data-Network TCO Cost Distribution

Data Network		
35% Capital	11%	Network hardware and software
	2%	Management software
	14%	Desktop hardware and software
	8%	Server hardware and software
56% Staffing	13%	Desktop application and server support (including remedial help desk)
	7%	Higher level desktop support (level 3)
	36%	Network infrastructure support
		15% Help desk and level 1 and 2 support
		21% Senior level technical resources
9% Facilities	1%	Desktop and server maintenance
	1%	Network maintenance (switch, router, hardware, and software maintenance)
	7%	Telecom lines, circuits, dial-up access

Table 3 Voice-Network TCO Cost Distribution

Voice Network		
24% Capital	5%	PBX Hardware and Software
	2%	Digital Handsets
	17%	Applications and other (operator consoles, T1 Muxes, etc.)
34% Staffing	14%	Adds/Moves/Changes
	20%	Senior WAN designers, telecom designers, consultants and staff
42% Facilities	36%	Circuit costs
	6%	Mux, CSU, DSU, ACD voicemail software maintenance costs

In the 100-user business case, we assume an annual voice-network budget of $800,000 and an annual data-network budget of $600,000.

In order to ensure comparable budget allocations, the data-network budget includes both network transport and networked desktop support, whereas the voice-network budget includes support for the entire voice-network infrastructure including handsets.

An additional key assumption of this business case is that the incremental capital investment will consist largely of the hardware and software capital required to pass telephony traffic over the existing data network. In the initial stages of implementation, these will operate in tandem with the existing telephony services infrastructure. A full transition of this infrastructure will be accomplished in the latter stages of the life cycle under analysis.

The required hardware and software capital consists of:

- IP phones
- A Windows NT server-based call-management server and license fee
- Analog and digital trunk gateways linking to existing analog handsets, fax machines, modems, and existing telephony networks, as well as established digital PBXs
- Allocated distribution for switch and router upgrades for production-quality voice services.

There are many scenarios an organization faces in its voice-network infrastructure that drive the planning of an IP telephony network. Five such scenarios are identified as:

- Building a new satellite office
- End of life for PBX or support contract
- Necessity for online e-commerce implementation
- Outgrown current PBX capacity
- Moving to a new location

This 100-user scenario is representative of a small-to mid-sized branch office. The PBX is nearing the end of its lifecycle and maintenance contracts. In order to most accurately reflect the scenario that most organization's network changes occur in gradual phases versus all at once, a set of three distinct transition phases will be defined:

- Year 1—25 users will be converted to IP telephony using IP phones, while 75 users remain on the legacy circuit switched network.
- Year 2—50 users will be converted to IP telephony. 25 users will use softphone utilities, and 25 users will use IP phones.
- Year 3—The remaining 25 users will be converted to IP telephony with IP phones.

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Figure 8 100-User Network—Year 1

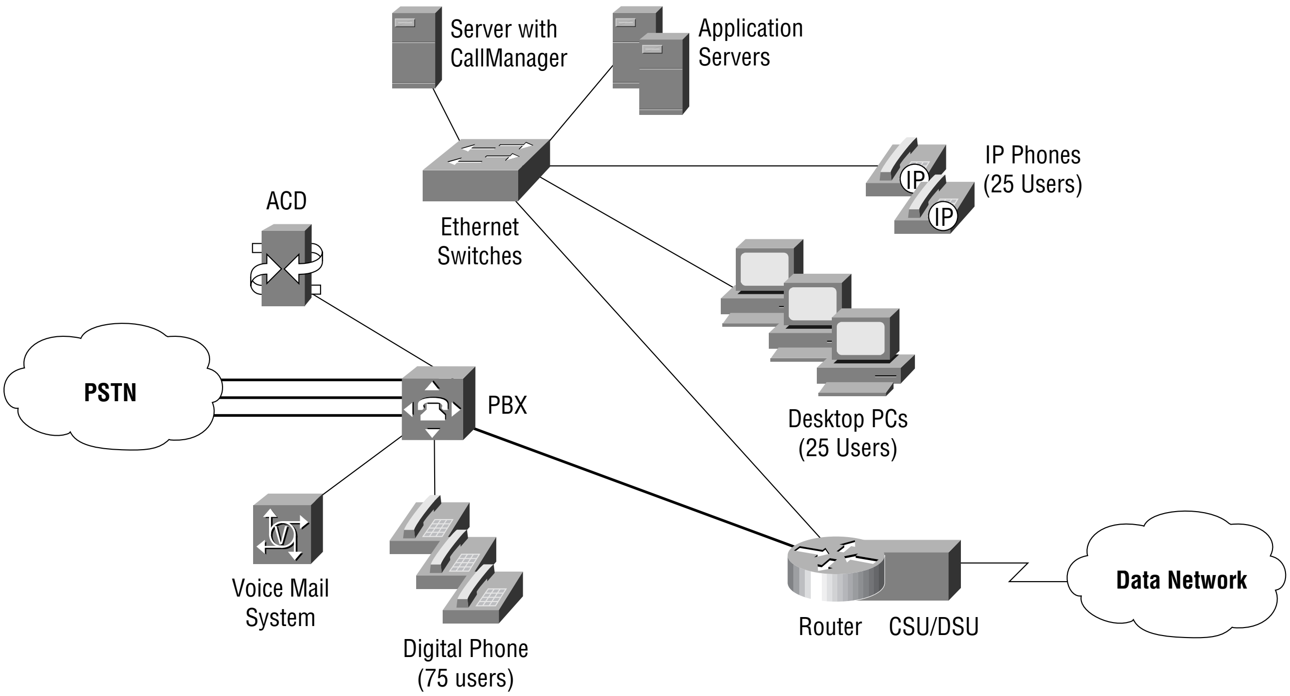

Table 4 lists assumptions generic to all three year phases.

Table 4 100-User Assumptions For All Three Year Implementations

- The annual voice budget is $800,000, or $8,000 per user, based on a primary research compiled by Renaissance Worldwide, Inc.
- The annual data budget is $600,000, or $6,000 per user, based on a primary research compiled by Renaissance Worldwide, Inc.
- The burdened cost of the voice-over-data supporting capital is $300 per user. This consists of $100 for the distributed cost for the gateway trunk (1 DS0 on a voice port is $400, and it is assumed four people will share one DS0), $150 licensing fee for CallManager software, and $50 allocated for additional costs for router enhancements to support production-quality voice services. Existing analog phones, faxes, and modems communicate with the telephony network through the analog gateway.
- The cost/user for the IP phones is $450 per user for the handset. One data support staff person can install five IP phones a day.
- 20 percent of the long distance charges are intra-company calls (and faxes). The costs associated with these calls are eliminated by those users using VoIP services.
- Annual multi-service telephony hardware and software maintenance charges are 8 percent of capital price, whereas annual PBX hardware and software maintenance charges are 6 percent of the capital price.
- The average compensation cost per employee (salary and benefits) for this business case is estimated at $64,000 per year.
- The effort associated with telecom moves, adds and changes is reduced by 75 percent for those users whose telephony services are transitioned over to the data network.
- Voicemail and ACD will continue to be supported by the PBX until the third year.
- The number of voice network support staff is two:
  - One PBX hardware technician
  - One designer/telecom support person
- The number of data net support staff is four
  - Two help desk support staff—one prime shift, one secondary shift
  - One applications support person
  - One switch and router support person
- The average cost per support person is $79,300 for the voice network and $91,500 for the data network. These numbers include both salary and benefit costs.
- The support-task distribution profile for the voice- and data-network support staff is similar to that shown in Tables 2 and 3.
- Telephony voice services are supported by a single T1 circuit to the regional LEC, that is priced at $1500 per month.
- The Internet connection is via a 384 kbps Frame Relay connection priced at $1200 per month; this connection will require upgrading to a 512 kbps connection priced at $1270 per month. A one-time $500 upgrade charge is required by the provider.
- Voice mail and ACD services will initially be supported by the PBX. All maintenance for the PBX, voice mail system, and ACD will be terminated by the end of the third year.
- No additional analog phones or PBX modules will be purchased.

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Table 5 lists the assumptions for the first year of implementation.

Table 5 100-User Year-1 Assumptions

- The existing voice and data networks operate in parallel.
- 75 users' digital phones remain in place.
- 25 users' phones are replaced by IP phones.
- The IP phones can communicate with local digital phones and with the telephony network through the existing PBX via the digital trunk gateway. The need for this connectivity goes away at the end of the third year.
- CallManager server is installed.

Given these assumptions, the estimated Year-1 costs are shown in Table 6 and the estimated savings are given in Table 7.

Table 6 100-User Network Year-1 Implementation Costs

Capital Costs		
Burdened Hardware and Software Costs for 25 Users ($300 x 25 users)		$7500
25 IP Phones ($450 x 25 users)		$11,250
CallManager Server		$5000
	Total Capital Costs	$23,750
Staff Costs		
Support Cost to Install and Configure IP Phones (5 person days for 25 IP phones) [($91,500 salary) ÷ (260 work days/year)] x (5 days)		$1760
Install and Configure CallManager Server [($91,500 salary) ÷ (260 work days/year)] x (5 days)		$1760
	Total Staff Costs	$3520
Facilities Costs		
Annual Hardware Maintenance Charges 8% of Capital Costs = ($23,750 x.08)		$1900
Additional Monthly Bandwidth Increase ($500 installation) + [12 months x ($1270 – $1200)]		$1340
	Total Facilities Costs	$3240
Total		**$30,510**

Table 7 100-User Network Year-1 Cost Avoidance

Capital Savings		
PBX Hardware and Phones		$0
	Total Capital Savings	$0
Staff Savings		
Cost Avoidance—Reduced Move, Add, and Change Costs [($800,000 capital budget) x (14% moves, adds, and changes) x (25% users changed to IP Telephony) x (75%)]		$21,000
	Total Capital Savings	$21,000
Facilities Savings		
Reduced Circuit Costs [($800,000 capital budget) x (36% circuit costs) x (20% calls now over IP) x (25% users implemented)]		$14,400
	Total Facilities Savings	$14,400
Total		**$35,400**

Thus, the Year 1 ROI is 16 percent ($35,400–$30,510) ÷ ($30,510). This Year-1 capital investment will continue to be more aggressively outpaced by the cost reduction, staff reduction, and productivity benefits accrued in the latter stages of the implementation life cycle.

Table 8 lists the second year implementation assumptions.

Table 8 Second Year Assumptions

- 25 more users are switched to IP phones, and 25 users are converted to Softphone utilities.
- The remaining 25 users will continue to use the digital phones connected through the PBX.
- The PBX hardware technician position has been eliminated because the data support group assumes full responsibility for moves, adds, and changes. This scenario saves approximately $79,300 per year.

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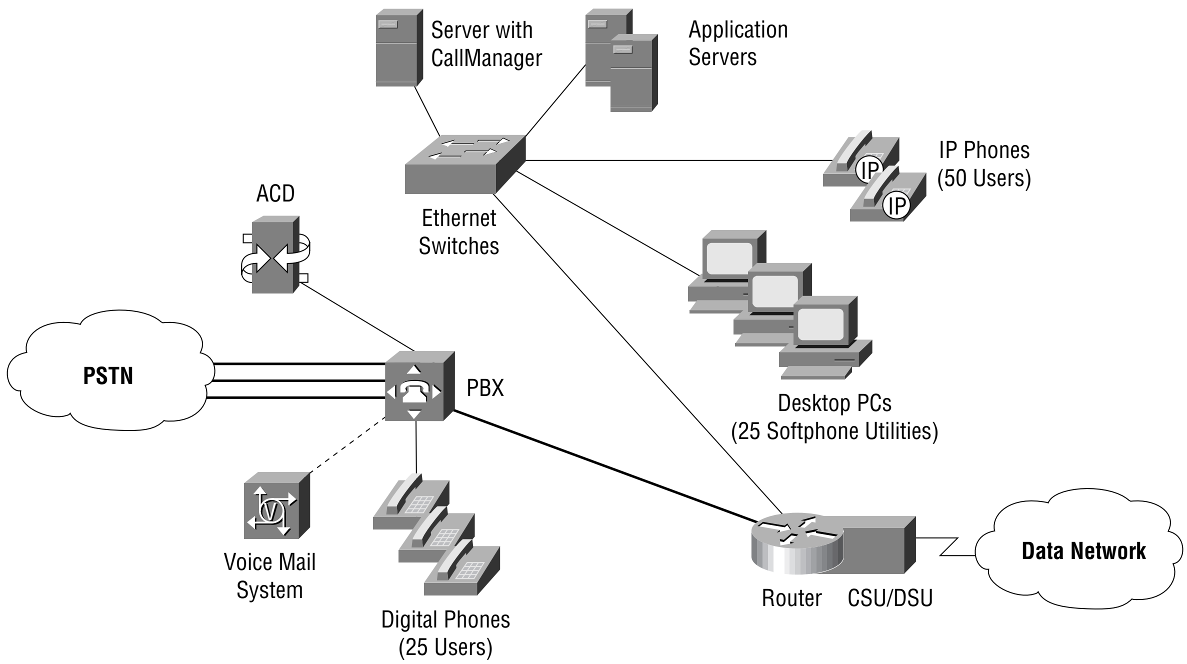
Figure 9 100-User Network—Year 2

San Francisco Site



The network structure for Year 2 is shown in Figure 9.

The costs associated with Year 2 are shown in Table 9, while the associated benefits are shown in Table 9. Note that the savings attributable to the technician position elimination is estimated at $59,475 because of the assumption that the position is eliminated in the first quarter of the year ($59,475 is three fourths of $79,300).

Table 9 100-user Network Year-2 Costs

Capital Costs	
Burdened Hardware and Software Costs for 50 Users	
($300 x 50 users)	$15,000
25 Additional IP Phones	
($450 x 25 users)	$11,250
Total Capital Costs	$26,250
Staff Costs	
Support Cost to Install and Configure	
(5 person days for 25 IP phones)	
[($91,500 salary) ÷ (260 work days per year)] x (5 days)	$1760
Total Staff Costs	$1760
Facilities Costs	
Incremental Hardware and Software Maintenance	
8% of capital costs ($26,250 x .08)	$2100
Maintenance Costs from Year 1 Implementation	$1900
Upgraded Circuit Costs	
12 months x ($1270 – $1200)	$840
Redundant Frame Relay Circuit	
[$500 installation + (12 months x $1270)]	$15,740
Total Facilities Costs	$20,580
Total	**$48,590**

Table 10 100-user Network Year-2 Cost Avoidance

Capital Savings	
PBX Hardware and Phones	$0
Total Capital Savings	$0
Staff Savings	
Cost Avoidance—Reduced Move, Add, and Change Costs	
[($800,000 capital budget) x (14% moves, adds, and changes) x (75% users changed to IP Telephony) x (75%)]	$63,000
Position Elimination—Voice Hardware Technician	
($79,300 annual salary amortized for 9 months)	$59,475
Total Staff Savings	$122,475
Facilities Savings	
Reduced Facilities Circuit Costs	
[($800,000 capital budget) x (36% circuit costs) x (20% intracompany) x (75% users)]	$43,200
Total Facilities Savings	$43,200
Total	**$165,675**

The Year-2 ROI is an attractive 241 percent ($165,675 – $48,590) ÷ ($48,590), boosting the overall investment return substantially.

Finally, operating assumptions for Year 3 are shown in Table 11.

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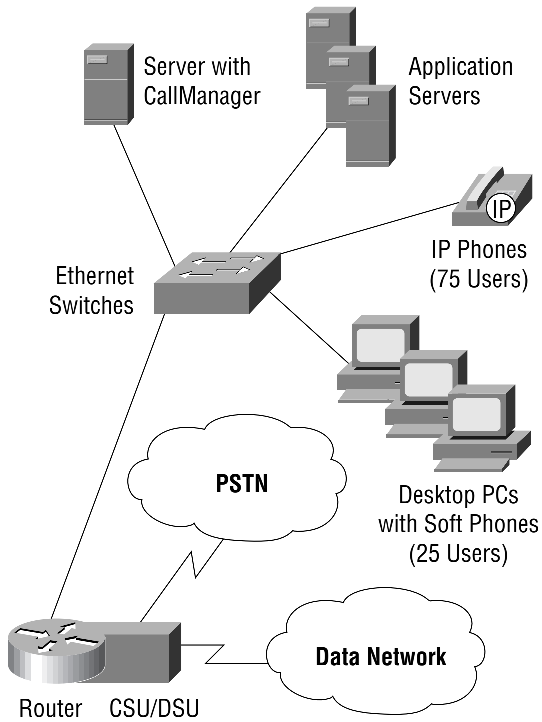
Table 11 100-User Year-3 Assumptions

- The final 25 digital handset users are switched over to IP phones.
- The entire legacy voice-network infrastructure has been phased out and all telephony services are now supported on the data network.
- The senior voice staff person is now a member of the merged support team.
- All PBX, ACD, and voice mail maintenance is terminated.
- A second Frame Relay circuit at 512 kbps is set up to the service provider as a backup to the primary 512 kbps circuit and for load sharing.
- A redundant CallManager Server is installed for $5000.
- A unified messaging implementation would obviate the need for the existing voice-mail and fax systems. The price of the hardware and software upgrades for the server is $20,000, based upon current industry prices for computer telephony integration products for small sites. The annual cost avoidance benefit is estimated at $308,000, assuming two hours of reduced overhead per site person per week per year [($64,000 ÷ 2080 hours a year) x (100 hours per year) x (100 employees)].
- A call center implementation has an associated implementation probability of 35 percent. This implementation provides the basis for online ordering through the Internet while also giving customers the option to communicate with a real customer service representative at any time during the product browsing or ordering process. This system is estimated to increase product revenue by $120,000. This value is derived by an industry standard of annual revenue per employee is $120,000. We assume that the call center application will increase the revenue-per-employee by a very conservative 1 percent in the first year of implementation. The cost of the required hardware and software is $35,000, which would require 10 days to install and integrate and $100 per user license fee.
- A desktop videoconferencing/interactive collaboration implementation has an associated implementation probability of 45 percent. This implementation has the potential of effectively complementing the unified messaging implementation by supporting direct instead of store and forward interaction. This system is estimated to improve communication efficiency by an average of two hours per week per site employee. No additional software is required, however, one-fourth day per user training is anticipated ($6,154). The annual cost-avoidance benefit is estimated at $110,000.

The network structure for Year 3 is shown in Figure 10.

Figure 10 100-User Network—Year 3



The costs associated with the full phasing over of the voice network in Year 3 are shown in Table 12 and the associated benefits are shown in Table 13.

Table 12 100-User Network Year-3 Costs

Capital Costs	
Burdened Hardware and Software Costs for 25 Users ($300 x 25 users)	$7500
25 Additional IP Phones ($450 x 25 users)	$11,250
Unified Messaging Windows NT Server	$20,000
Unified Messaging Software License ($100 x 100 users)	$10,000
Redundant CallManager Server	$5000
Total Capital Costs	$53,750
Staff Costs	
Incremental salary increase from Senior Voice Staff Person now a Member of the Merged Support Team ($91,500 – $79,300)	$12,200
Support Cost to Install and Configure (5 staff days on phones, 10 staff days on servers) [($91,500 annual salary) ÷ (260 days/year)] x (15 days)	$5279
Total Staff Costs	$17,479
Facilities Costs	
Incremental Year 3 Hardware and Software Maintenance ($53,750 x 8%)	$4300
Maintenance of Year 2 Implementation	$2100
Maintenance of Year 1 Implementation	$1900
Circuit Upgrade Charge [12 x ($1270 – $1200)] + (12 x $1270 for redundant frame relay 512Kbps circuit)	$16,080
Total Facilities Costs	$24,380
Total	**$95,609**

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Table 13 100-User Network Year-3 Cost Avoidance

Capital Costs	
Cost Avoidance PBX Hardware and Handsets	$0
Total Capital Savings	$0
Staff Costs	
Cost Avoidance—Reduced Adds, Moves, and Changes ($800,000 x 14% x 100% of employees) x (75%)	$84,000
Position Elimination—from year 2 Implementation	$79,300
Total Staff Savings	$163,300
Facilities Costs	
Reduced PBX, ACD, Voicemail, and Handset Maintenance Costs ($800,000) x (6%)	$48,000
Reduced Long Distance Charges ($800,000 x 36% x 20%)	$57,600
Total Facilities Savings	$105,600
Total	**$268,900**

The Year-3 ROI is 181 percent ($268,900–$95,609) ÷ ($95,609) making the overall investment even more compelling.

The impact of the unified messaging implementation is considered separately as part of the present value summary analysis.

In summary, the investment costs, benefits, and three-year life-cycle ROI are summarized in Table 14. As can be seen, the life-cycle ROI is an attractive 169 percent.

Table 14 100-User Network—Lifecycle ROI Results

	Total Cost	Total Benefit	Investment ROI
Year 1	$30,510	$35,400	16%
Year 2	$48,590	$165,675	241%
Year 3	$95,609	$268,900	181%
Total =	$174,709	$469,975	169%

Finally, in addition to the financial case, it is also important to assess the degree to which the transition methodology defined in this business case best meets the requirements of an early-majority implementer. The degree to which the approach satisfies these criteria, in addition to the supporting rationale, is shown in Table 15.

Table 15 Early-Majority Assessment Results

	Criteria Satisfied by Business Case Approach?	Supporting Rationale
Want to purchase productivity improvement for existing operations	Yes	Support productivity improvement gained through elimination of separate network support and reduced Move/Add/Change requirements. Professional productivity improvement gained through both Universal Messaging and Shared Video and Whiteboard desktop applications.
Want to minimize discontinuity with previous approaches	Yes	Initial coexistence approach with phased over connectivity results in more of an evolutionary versus revolutionary phaseover.
Want technology evolution versus revolution	Yes	Initial coexistence approach with phased over connectivity results in more of an evolutionary versus revolutionary phaseover.
Want the associated product(s) to enhance, not overthrow, the established ways of doing business	Yes	Business Operations and Productivity can be improved through implementation of Call Center, Unified Messaging and Shared Video and Whiteboard applications.
Don’t want to debug someone else’s product	Vendor-Dependent	Consult “Strategic Vendor Considerations”

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Net Present Value and Internal Rate of Return

Earlier in this document we cited the implementation of multiservice applications as a key factor in determining the total benefit attributable to the multiservice network. This section uses an approach called the options model to capture the intangible or "soft" benefits with the implementation of applications. A full description and example of this model is attached in the Appendix. This model calculates the intangible, incremental return attributable to the implementation of one or more of the multiservice applications described earlier.

First we determine the net present value (NPV) and internal rate of return (IRR) associated with the multi-service network prior to adding any applications by subtracting the costs of implementation at the beginning of the year from the benefit realized by the end of the previous year. Applying a three-year discount rate of 8 percent yields a baseline life-cycle NPV of $230,810 [(Year 0 = $-30,509, Year 1 = ($35,400 – $48,590), Year 2 = ($165,675 – $95,609), Year 3 = $268,900]. The IRR is 128 percent.

Now take a look at each of the multiservice applications. The unified messaging application is projected to be implemented at the beginning of Year 3 with a projected annual benefit is estimated at nearly $308,000. The implementation cost is relatively low at $20,000 for the server, $10,000 for the software licenses, and $1600 a year maintenance cost (assuming 8 percent annual software maintenance cost). For the third year alone, the benefit is $308,000. Using the discount rate of 8 percent, the calculated NPV for the implementation of unified messaging is $253,585.

Call center implementation is projected for Year 3 with an associated probability of 35 percent. The total benefit is projected to be $120,000 with the cost of the associated hardware and software equaling $48,519 ($35,000 for the server, ten days for installation integration, and $100 license fee for 100-users). The NPV of this implementation is $62,592.

Lastly, the Year 3 benefit for the videoconferencing/interactive collaboration application is estimated at $110,000. The probability of its implementation is 45 percent. No additional hardware or software costs are projected for this application, but two hours per employee is required for training, equalling $6154. Once again, assuming the 8 percent discount rate, the calculated NPV is $95,697.

Unified messaging is implemented in Year 3 and therefore is not a part of the options model formula. Instead determine the probability of implementing at least one (either call center or videoconferencing/interactive collaboration) of the multi-service applications. By assigning the probability of implementation of call center at 35 percent, and videoconferencing/interactive collaboration at 45 percent, the combined probability of at least one of the applications being implemented is therefore 80 percent (35 percent + 45 percent).

The minimum value of the respective application NPVs is the NPV associated with the call center implementation ($62,592). Therefore, the incremental NPV that can be attributed to the multiservice application implementation is 0.80 x $62,592 = $50,074. This scenario then leads to a total baseline plus application NPV of $534,469 ($230,810 + $253,585 + $50,074).

The 1000-User Configuration

The first business case, the 100-user site, was more representative of a small to midsized branch location within the Enterprise organization with no aggressive plans for growth in the near future. The 1000-user site consists of a corporate campus of 800 employees located in San Francisco, with growth plans to add 200 employees and build three buildings over the next three years. The locations of the buildings will be one in San Francisco, a sales office in New York, and a European Headquarters in London. For this case, assume the following three-year phased strategy:

- Year 1 will add 50 users to San Francisco's current site
- Year 2 will add 50 more users in a new building in San Francisco and open the London office with 25 users
- Year 3 will build a sales office in New York with 25 users and add 50 users to the London office

This growth rate increases the company size from 800 employees to 1000 employees at the end of three years.

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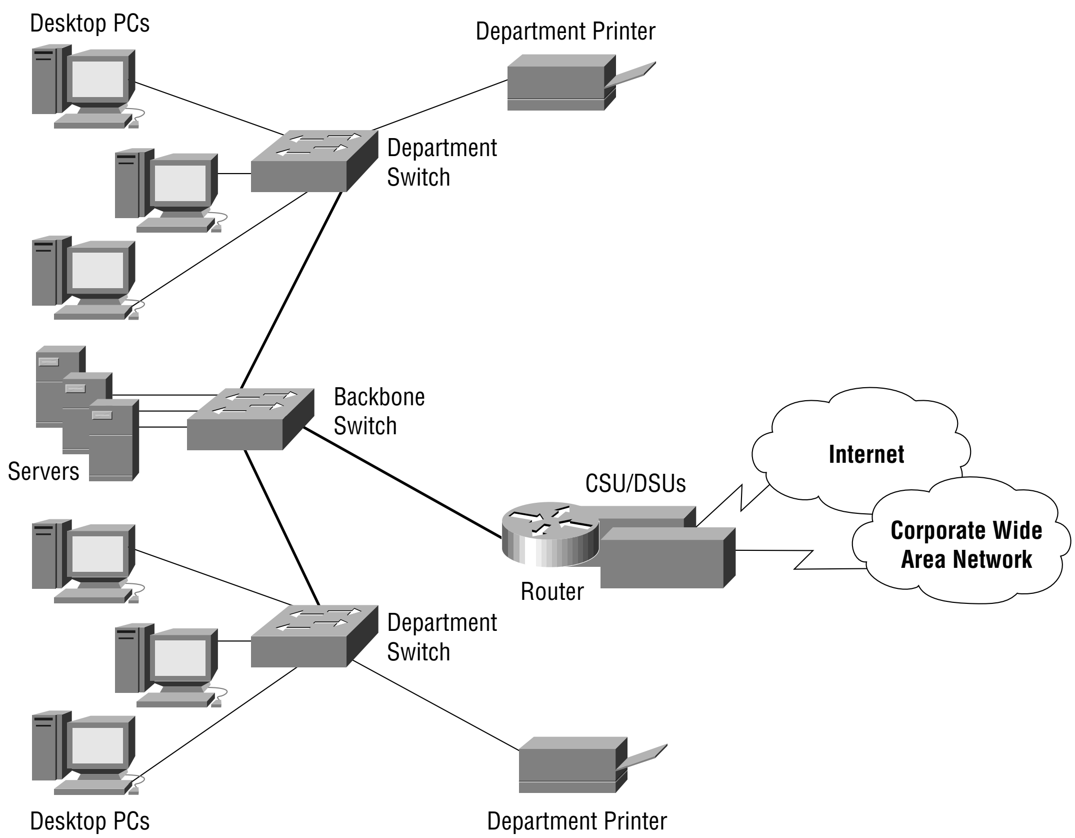
The topology of the data network infrastructure that supports the users in the San Francisco campus is shown in Figure 11. In this case, it is assumed that all intra-departmental connectivity is provided by a 10/100BaseT Ethernet connection to every desktop. An external router is connected to the Layer 3 switch that supports wide-area connections to the company wide area network as well as the Internet. Centralized application servers are directly connected to the Layer 3 switch.

Figure 11 Departmental Data Network Connectivity



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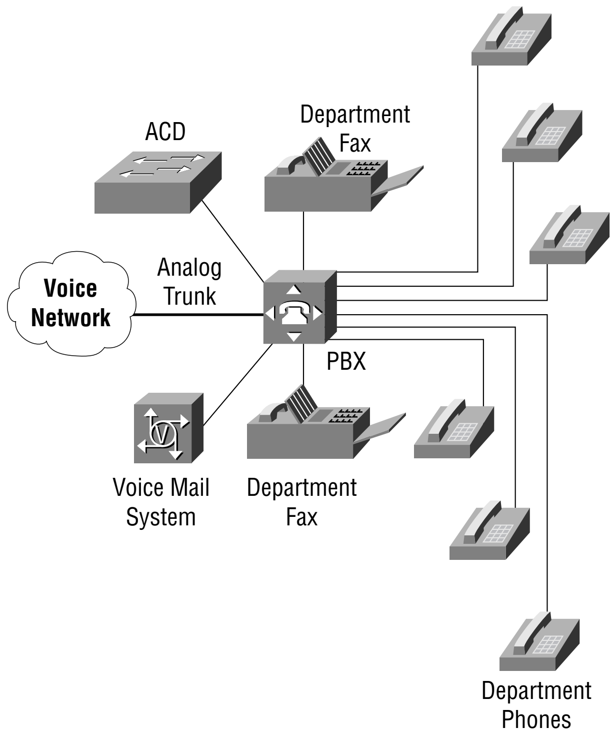
Voice-network connectivity is shown in Figure 12. Here it is assumed that all local handset and fax connections are through a centralized PBX, which also supports a centralized ACD and voice mail system and all the external trunks to the telephony network.

Figure 12 Legacy Voice Network



In order to ensure comparable budget allocations, the data network budget includes both network transport and networked desktop support while the voice network budget includes support for the entire voice network infrastructure including handsets. Cost distributions within these budgets are consistent with those contained in Tables 2 and 3 of the 100-user scenario. At the beginning of this case, the voice budget is $6 million ($7500 per user), and the data budget is $4 million ($5000 per user). These estimates are based upon the results of primary market research compiled by Renaissance Worldwide Inc.

Similar to the 100-user case, a key assumption is that the incremental capital investment will consist largely of the hardware and software capital required to pass telephony traffic over the existing data network.

The required hardware and software capital consists of:

- IP phones
- A Windows NT server-based Call Management Server and license fee
- Analog and digital trunk gateways to existing analog handsets, fax machines, modems, and existing telephony networks as well as established digital PBXs
- Allocated distribution for switch and router upgrades for production-quality voice services

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Generic assumptions to the three-year phased implementation are in Table 16.

Table 16 1000-User Generic Assumptions to the Three-Year Implementation

- 20 percent of the long distance charges are intra-company calls (and faxes). The costs associated with these calls are eliminated by those users using Voice over IP services.
- The burdened cost of the voice over data supporting capital is $300 per user. This consists of $100 for the distributed cost for the gateway trunk (one DS0 on a voice port is $400, and it is assumed four people will share one DS0), $150 licensing fee for CallManager software, and $50 allocated for additional costs for router enhancements to support production-quality voice services.
- The average cost of an IP phone is $450 per user, and one data support staff person can install five phones per day.
- The average cost of PBX modules and handsets is $610 per user according to Gartner Group, 1998.
- Annual multiservice telephony hardware and software maintenance charges are 8 percent of capital price, while annual maintenance charges on PBX telephony hardware and software is 6 percent.
- Installation costs to install a new PBX is 10 percent of the list price. The average list price of a PBX that supports 25 users is $15,000, and for a PBX that can support 50 or 75 users is $35,000. Therefore, the estimated installation prices would be $1500 and $3500 respectively.
- The average cost per site worker for this business case is estimated at $75,000 per year.
- The effort associated with moves, adds, and changes will be reduced by 75 percent for each of the users that are successfully transitioned to IP telephony.
- The existing data and voice networks operate in parallel.
- The IP phones can communicate with existing digital handsets in other departments and with the telephony network through the existing PBX via the digital trunk card in the multiservice router.
- It is assumed a multiservice router is in place (most data managers are implementing multiservice routers).
- Voicemail and ACD will continue to be supported through the PBX for the initial 800 users not being converted to IP Telephony.
- Local trunk connection in each country will not vary from a circuit-switched scenario or a packet-switched scenario.
- The number of voice network support staff is 10:
  - Five hardware/wiring support technicians.
  - Three PBX, Voice Mail, ACD technical support staff.
  - Two Telecom Designer support staff.
- The number of data net support staff is 12:
  - Four help desk support staff (three prime shift, one secondary shift).
  - Three applications Layer 2 and Layer 3 support staff.
  - Three network Layer 2 and Layer 3 support staff.
  - Two senior network designers or engineers
- The average cost per support person is $79,300 for the voice network and $91,500 for the data network. These numbers include both salary and benefit costs.

Year 1 is characterized by the generic assumptions listed in Table 17.

Table 17 1000-User Network Year-1 Assumptions

- 50 users are added to the San Francisco campus and are assigned IP phones.
- The CallManager functionality can be accommodated by a new CallManager Windows NT server at an average cost of $5000 for the hardware, and five data-support-staff days to install.
- The data and voice budgets increase to remain at $7500 per user for voice, and $5000 per user for data.

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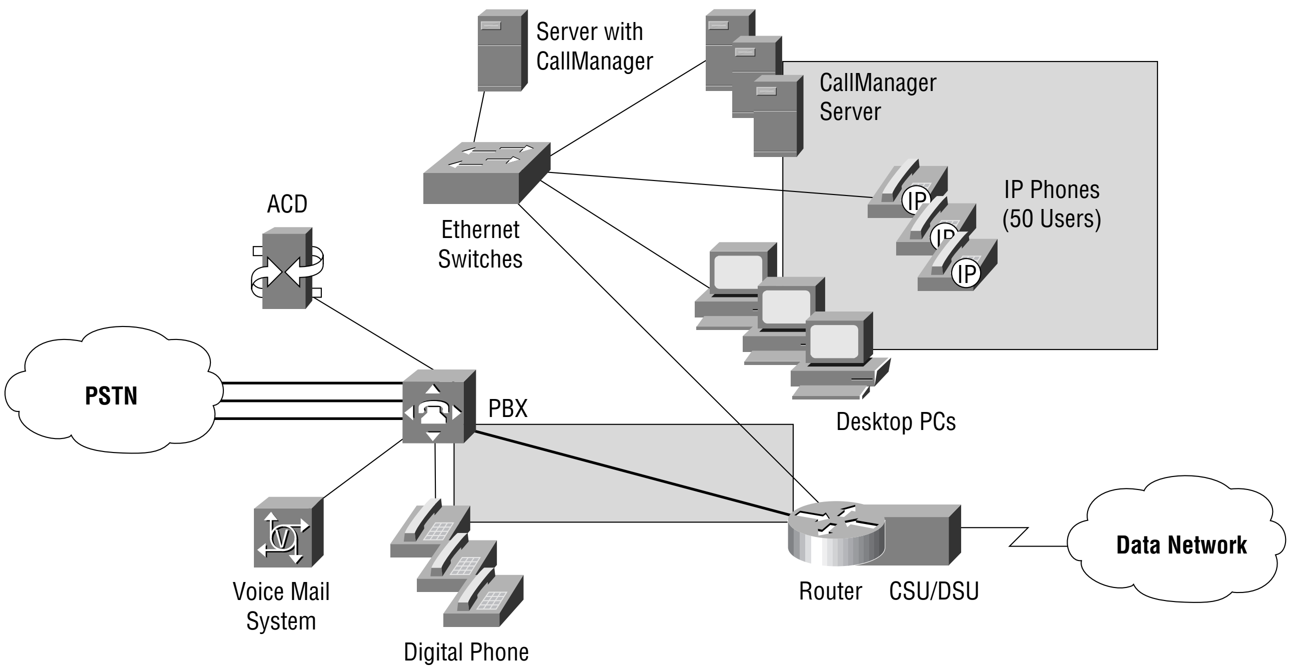
Figure 13 1000-User Network Year-1 Implementation



Given these assumptions, the estimated Year-1 implementation costs are shown in Table 18.

Table 18 1000-User Network Year 1 Implementation Costs

Capital Costs		
Burdened Hardware and Software Costs for 50 Users ($300 x 50)		$15,000
Additional IP Phones ($450 x 50)		$22,500
CallManager Windows NT Server		$5000
	Total Capital Costs	$42,500
Staff Costs		
Install CallManager and Voice Trunks on Router [($91,500 salary) ÷ (260 days per year)] x (5 days)		$1760
Support Cost to Install and Configure 50 IP Phones [($91,500) ÷ (260 days/year)] x (10 days)		$3519
	Total Staff Costs	$5279
Facilities Costs		
Annual Hardware and Software Maintenance Charges ($42,500) x (8%)		$3400
	Total Facilities Costs	$3400
Total		**$51,179**

The estimated savings include the following amounts as shown in Table 19.

Table 19 1000-User Network Year-1 PBX Cost Avoidance

Capital Savings		
Cost Avoidance—PBX Hardware and Handsets ($610 x 50)		$30,500
	Total Capital Savings	$30,500
Staff Savings		
Cost Avoidance—Reduced Move, Add, and Change Costs [($7500 voice budget per user) x (14%) x (50 users) x (75%)]		$39,375
Avoidance of Telecom Staff installing new PBX		$3500
	Total Staff Savings	$42,875
Facilities Savings		
Maintenance Costs [($7500) x (6%) x (50 users)]		$22,500
	Total Facilities Savings	$22,500
Total		**$95,875**

Therefore, the Year-1 ROI is 87 percent ($95,875–$51,179) ÷ ($51,179), which is a reasonably attractive result that illustrates the beneficial impact of workforce consolidation and circuit reduction.

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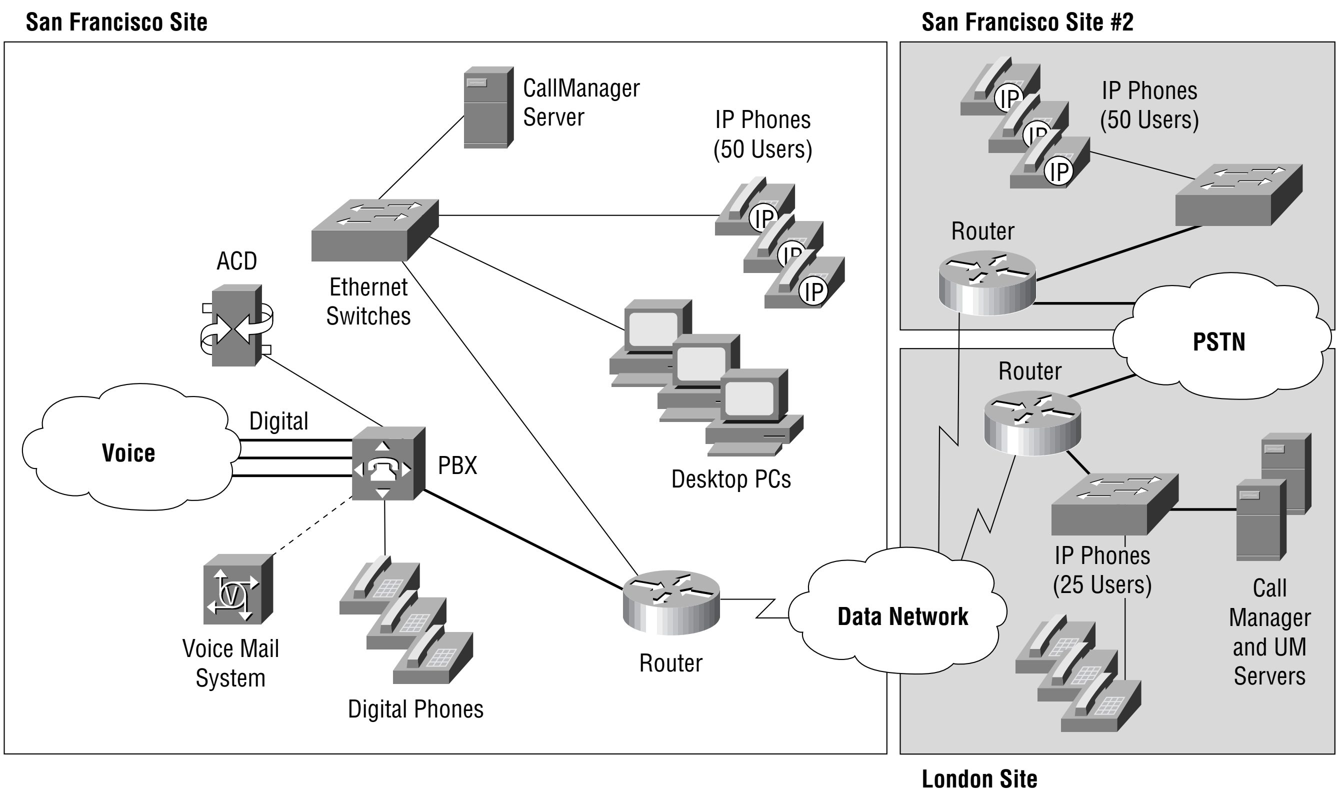
Year 2 operating assumptions are shown in Table 20.

Table 20 1000-User Network Year-2 Assumptions

• 50 new employees are added to the San Francisco site. To accommodate this growth, a new building is built for 50 employees. This new building will have 50 new IP phones installed. • The London office is built, 25 new employees are hired, and 25 IP phones are installed. • A unified messaging server, costing $20,000, is installed in the London office with licensing fees of $100 per user and five data-support-staff days to install. • A CallManager server is installed in the London office at a cost of $5000, and five data-support-staff days to install. • One voice technical staff person moves to the data support staff to support the data network in London. • To increase bandwidth from 64 kbps to 128 kbps internationally, is $500 a month and $100 a month domestically, according to www.webtorials.com as noted in Business Communications Review, March 1999. Installation is a $500 one-time charge. • Redundant 128 kbps circuits are installed at the San Francisco site in the second building and the London office. • The datacom budget pays for multiservice router and Ethernet to each desktop in the new San Francisco and London buildings. This router would be installed in either an IP telephony or PBX scenario. • The data and voice budgets increase to remain at $5000 per user for data and $7500 per user for voice. • A unified messaging implementation would obviate the need for the existing voice mail and fax systems in the London office. The price of the required middleware is $20,000 based upon current industry prices, and the annual cost avoidance benefit is estimated as two hours of reduced overhead per site person per week.

The Network structure for Year 2 is shown in Figure 14.

Figure 14 1000-User Network Year-2 Implementation



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The associated costs associated with Year 2 are shown in Table 21.

Table 21 1000-user Network Year-2 Implementation Costs

Capital Costs		
Burdened Hardware and Software Costs for 75 Users		
($300 x 75 users)		$22,500
75 IP Phones		
($450 x 75)		$33,750
CallManager Server in London		$5000
Add Unified Messaging Windows NT Server to London Office		$20,000
Add Unified Messaging software to London Office		
($100 x 25 users)		$2500
	Total Capital Costs	$83,750
Staff Costs		
Install and Configure IP Phones		
[($91,500 salary) ÷ (260 days per year)] x (15 days)		$5279
Install and Configure Servers		
[($91,500 annual salary) ÷ (260 days per year)] x (10 days)		$3519
	Total Staff Costs	$8798
Facilities Costs		
Annual Hardware and Software Maintenance Charges		
Year 2 Implementation ($83,750) x (8%)		$6700
Year 1 Implementation		$3400
Frame Relay upgrade from 64K to 128K		
London [(12 months) x ($500 a month) + ($500 install)] x 2		$13,000
San Francisco [(12 months) x ($100 a month) + ($500 install)] x 2		$3400
	Total Facilities Costs	$26,500
Total		**$119,048**

Though the associated benefits are shown in Table 22, note that the savings attributable to the technician position elimination is estimated at $55,425 due to the assumption that the position is eliminated in the first quarter of the year; $55,425 is three fourths of $73,900.

The second year cost savings is shown in Table 22.

Table 22 1000-User Network Year-2 PBX Cost Avoidance

Capital Savings		
Cost Avoidance—PBX Hardware and Handsets		
($610) x (75 users)		$45,750
	Total Capital Savings	$45,750
Staff Savings		
Cost Avoidance—Reduced Move, Add, Change Costs		
[($7500 per user) x (14% moves, adds, and changes) x (75 users) x (75%)]		$59,063
Avoidance of Installation of New PBX in San Francisco		
Avoidance of Installation of new PBX in London		$3500
Position Elimination—Voice Hardware Technician		$3500
($73,900 annual salary amortized for 9 months)		$55,425
	Total Staff Savings	$121,488
Facilities Costs		
Reduced Circuit Charges		
($7500 per user) x (36% circuit costs) x (20% intra-company calls) x (25 users in London)		$13,500
($7500 per user) x (36% circuit costs) x (20% intra-company calls) x (100 San Francisco Users)		$54,000
Maintenance Costs Year 2 Implementation		
($7500) x (6%) x (75 users)		$33,750
Year 1 Implementation		$22,500
	Total Facilities Savings	$123,750
Total		**$290,988**

The Year-2 ROI is a fairly attractive 144 percent ($290,988 – $119,048) ÷ ($119,048). Similar to the 100-user case, the impact of the unified messaging implementation can be considered separately as part of our related NPV summary analysis.

Finally, the third year operating assumptions are summarized in Table 23.

Table 23: 1000-User Network Year-3 Assumptions

- 50 users are added to the London office, all with IP phones.
- A New York sales office is built, 25 people are hired; all will use IP phones.
- Datacom budget pays for multiservice router and Ethernet to each desktop in New York and London offices.
- Increased bandwidth in New York office from 64 K to 128 K is $100 a month, and a redundant circuit is added.
- Local trunk connectivity in each country will not vary from one scenario to the other.
- As new employees are added to the organization, the data and voice budgets increase to remain at $5000 per user for data, and $7500 per user for voice.
- A call center implementation has an associated implementation probability of 35 percent. This implementation provides the basis for online ordering through the Internet while also giving customers the option to communicate with a real customer service representative at any time during the product browsing or ordering process. This system is estimated to increase product revenue by $1,200,000. This value is derived from an industry standard of annual revenue per employee equaling $120,000. It is assumed that the call center application will increase the revenue per employee by a conservative 1 percent in the first year of implementation. The cost of the required hardware and software is $$43,519 ($35,000 for the hardware and software, $100 licensing fee for 50 telesales agents, and 10 days to install).
- A desktop videoconferencing/interactive collaboration implementation has an associated implementation probability of 45 percent. This implementation has the potential of effectively complementing the unified messaging implementation by supporting direct instead of store and forward interaction. This system is estimated to improve communication efficiency by an average of two hours per week per site employee. No additional software is required, however, one-fourth day per user training is anticipated ($61,538). The annual cost-avoidance benefit is estimated at $1,200,000.

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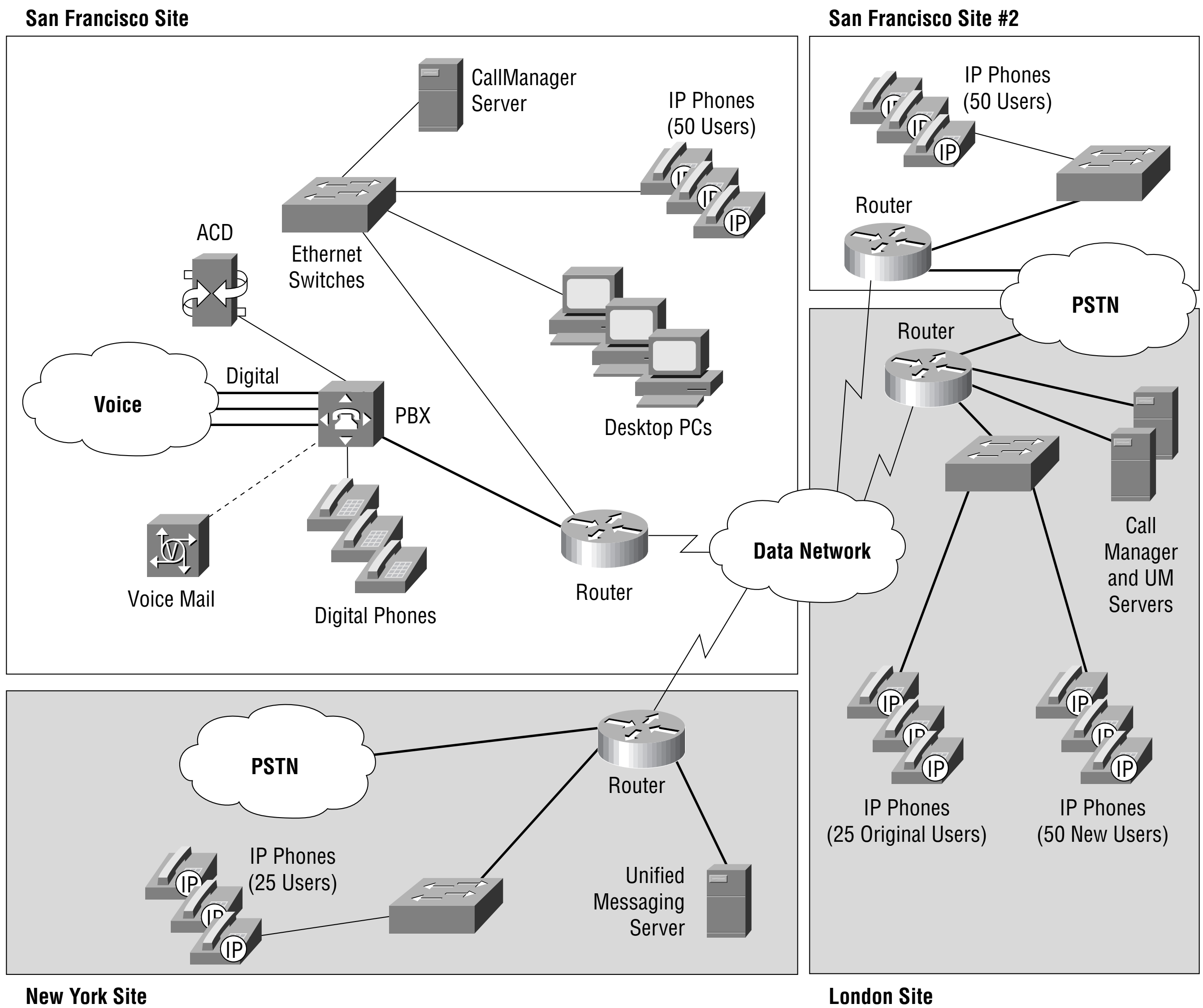
Figure 15 1000-User Network Year-3 Implementation



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The associated costs associated with the full phasing over of the voice network in Year 3 are shown in Table 24, while the associated benefits are shown in Table 25.

Table 24 1000-User Network Year 3 Implementation Costs

Capital Costs		
Burdened Hardware and Software Costs for 75 Users		
($300) x (75 users)		$22,500
75 IP Phones		
($450) x (75 users)		$33,750
Redundant CallManager Server in London		$5000
Redundant Call Manager Servers in New York		$10,000
Unified Messaging Server in New York		$20,000
Unified Messaging Licenses for New York and Additional Users in London		
($100) x (75 users)		$7500
	Total Capital Costs	$98,750
Staff Costs		
Support Cost to Install and Configure Servers		
[($91,500) ÷ (260 days)] x (15 days)		$5279
Support Cost to Install IP Phones		
[($91,500) ÷ (260 days)] x (15 days)		$5279
Increase in Salary as Voice Tech Moves to Data Support		
($91,500 – $79,300)		$12,200
	Total Staff Costs	$22,758
Facilities Costs		
Annual Hardware Software Maintenance Charges		
Year 3 Implementation ($93,750) x (8%)		$7500
Year 2 Implementation		$6700
Year 1 Implementation		$3400
Circuit Costs		
New York [($100) x (12 months) + (500 install)] x 2		$3400
London [($500) x (12 months)] x 2		$12,000
San Francisco [($100) x (12 months)] x 2		$2400
	Total Facilities Costs	$35,400
Total		**$156,908**

Table 25 1000-User Network Year-3 PBX Cost Avoidance

Capital Savings		
Cost Avoidance—PBX Hardware and Handsets		
($610) x (75 users)		$45,750
	Total Capital Savings	$45,750
Staff Savings		
Cost Avoidance—Reduced Moves, Adds, and Changes		
($7500) x (14%) x (75 users) x (75%)		$59,063
Avoidance of New PBX Installation in New York		$1500
Elimination of voice tech position from Year 2		$79,300
	Total Staff Savings	$139,863
Facilities Costs		
Reduced Circuit Charges London		
($7500 per user) x (36% circuit costs) x (20% intra-company calls) x (75 users)		$40,500
Reduced Circuit Charges New York		
($7500 per user) x (36% circuit costs) x (20% intra-company calls) x (25 users)		$13,500
Reduced Circuit Charges San Francisco		
($7500 per user) x (36% circuit costs) x (20% intra-company calls) x (100 users)		$54,000
Maintenance Costs		
Year 3 Implementation ($7500) x (75 users) x (6%)		$33,750
Year 2 Implementation		$33,750
Year 1 Implementation		$22,500
	Total Facilities Savings	$198,000
Total		**$383,613**

The Year-3 ROI is 144 percent ($383,613 – $156,908) ÷ ($156,908) which reflects the large capital, support, and facilities infrastructure changes that occur in the third year.

In summary the investment costs, benefits and three year lifecycle ROI are summarized in Table 26. As can be seen the lifecycle ROI is an attractive 136 percent.

Table 26 1000-User Network—Lifecyle ROI Results

	Total Cost	Total Benefit	Investment ROI
Year 1	$51,179	$95,875	87%
Year 2	$119,048	$290,988	144%
Year 3	$156,908	$383,613	144%
Total =	$327,135	$770,476	136%

Finally, in addition to the financial case, it is also important to assess the degree to which the transition methodology defined in this business case best meets the requirements of an early majority implementer. The degree to which the approach satisfies these criteria in addition to the supporting rationale is shown in Table 14. Early Majority adopter satisfaction criteria are similar to those shown for the 100-user business case.

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Net Present Value & Internal Rate of Return Analysis

Earlier in this document, the implementation of multiservice applications were cited as a key factor in determining the total benefit attributable to the multiservice network. In the 1000-user business case, the analysis of this implementation becomes even more important in order to show significant value germane to the applications necessary for completing the full business case. As in the 100-user case, the Options Model is used to calculate the incremental return attributable to the implementation of one or more of the multiservice applications described earlier.

Begin by determining the NPV and IRR associated with the 1000-user network prior to adding any applications. Applying the cost savings less the costs of implementation, and applying a three year discount rate of 8 percent yields a baseline lifecyle NPV of $346,841 (year 0 = $-51,179, Year 1 = $95,875—119,048, Year 2 = $290,988—$156,908, Year 3 = $383,613) and an IRR of 123 percent.

Take a look at each of the multiservice applications. The unified messaging application is projected to be implemented at the beginning of Year 2 in London and the beginning of Year 3 in New York. The projected Year-2 benefit is estimated at $153,846, and the Year-3 benefit is estimated at $615,384 ($461,538 for London and $153,846 for New York.) The implementation cost is $23,360 for the server, installation, and maintenance in London in Year 2, and $23,360 for the server, installation, and maintenance in New York in Year 3, plus $1600 for maintenance capital for London. The total lifecycle benefit is $769,230. Using the same discount rate of 8 percent, the calculated NPV is $577,381 (Year 0 = $0, Year 1 = $-23,360, Year 2 = $153,846—$24,960, Year 3 = $615,384) with an IRR of 758 percent.

In the case of the call center, implementation is projected for Year 3 with an associated probability of 35 percent. The total benefit is projected to be $1,200,000 in additional business revenue with the cost of the associated hardware and software equaling $43,519. Applying the same type of NPV calculation that was performed for the multiservice messaging application, a calculated NPV is $915,288 (Year 0 = $0, Year 1 = $0, Year 2 = $-43,519, Year 3 = $1,200,000), and an IRR of 2,657 percent.

Lastly, the Year-3 benefit for the videoconferencing/ interactive collaboration application is estimated at $1,200,000. Its probability of implementation is 45 percent. No additional hardware or software costs are projected for this application. Once again, assuming the 8 percent discount rate, the calculated NPV is $899,840 (Year 0 = $0, Year 1 = $0, Year 2 = -$61,538, Year 3 = $1,200,000) with an IRR of 1,850 percent.

The probability of implementing at least one of the multiservice applications is 80 percent (35 percent + 45 percent). The minimum value of the respective application NPVs is the NPV associated with the videoconferencing/ interactive collaboration (approximately $900,000). Incorporating the options model formula (see Appendix), the incremental NPV that can be attributed to the multiservice application implementation is .80 x $900,000 = $720,000. This then leads to a total baseline plus application NPV of $1,644,222 (baseline NPV of $346,841 + unified messaging NPV of $577,381 + multiservice application implementation of $720,000).

Strategic Vendor Considerations

Earlier in this document, the business benefits attributable to being one of the early majority implementers were cited. These include the competitive advantage benefits of the early adopters combined with the technology stability provided to the majority users. It is this adoption phase that constitutes the implementation sweet spot for those companies that want to realize the optimum business benefits associated with a given technology.

Given their implementation criteria, a key requirement for the early majority is that they do not want to be in the business of debugging someone else's product or technology. This is easy enough to say. But what criteria should be used in product and vendor selection in order to ensure that the quantitative benefits defined in this business case are effectively realized?

In the case of multiservice network telephony, a few key criteria come into play. First, it is important to assess a vendor's product delivery track record. And not just in any product area, but rather products that support multiservice network telephony and VoIP services. Today, Cisco is a recognized leader in the delivery of VoIP services by virtue of its shipment of hundreds of thousands of VoIP products for the enterprise. This directly translates into direct development and support experience that ensures that multiservice telephony technology is sufficiently production ready for most users' requirements.

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However, it doesn't stop there. Cisco is unique amongst the major vendors in implementing multiservice network telephony services for its own corporate usage. This implementation directly supports the day to day communication and information needs of thousands of professional knowledge workers like yours. The result is a large-scale user and vendor implementation of these services that directly leads to technology maturity due to the scope and scale of the associated implementations. In addition, rapid problem resolution is driven directly by the requirements of demanding users.

All these factors directly contribute to the fact that Cisco is uniquely qualified to bring the benefits of multiservice network telephony services much sooner and on a much larger scale than any other vendor. Combining these services with the excellent Cisco reputation for service and support leads to an implementation rationale that is simply too compelling to ignore.

Summary and Conclusions

In defining a business case to support the transition to a set of new technologies and products, users need to be careful to ensure that all relevant supporting factors are considered to ensure the highest probability of success. These factors include projected product lifecycles for existing approaches, projected adoption rate for the new technologies and products under considerations, direct business benefits, and the relationship and partnerships that should be established.

This business case has both raised and documented the supporting business case rationale in each of these categories for multiservice telephony networking. More important, it has established a compelling business case rationale and financial analysis rationale for the early-adopter implementation of a multiservice telephony network supported by Cisco products and services.

Are you ready?

Appendix

The Options Model

One approach that has been used effectively to capture the bottom-line impact of alternative benefits is called the options model formula. The options model is a complementary, forward-looking business approach that looks at the net present value (NPV) of capital equipment investment; it is quantitatively expressed below.

Given a NPV for a network investment (referred to as NPV_{base}), the options model offers the potential for increased NPV in a manner similar to a stock-options model. In a classic stock-options model, an individual is granted the right to purchase a block of stock shares for a given price per share at a particular point in time. Individual probabilities of $p_a, p_b, p_c, \ldots, p_n$ are associated with the price of the stock rising to certain levels and thereby increasing the option holder's present value.

Similarly, in this business case, probabilities of $p_a, p_b, p_c, \ldots, p_n$ can be associated with the realization of either increased revenue or improved productivity (or both) through the enabling of new applications (and opportunities) a, b, c . . . n. The effective NPV of this investment is then conservatively forecast as:

$$NPV_{investment} = NPV_{base} + [(p_a + p_b + p_c + \ldots + p_n) \times \boldsymbol{min}\ (NPV_a, NPV_b, NPV_c, \ldots, NPV_n)$$

where NPV_{base} is the benefit from the base business case, NPV_i is the NPV benefit associated with the i^{th} opportunity option to which the target investment could be applied, and p_i is the probability of the business opportunity that generates NPV_i occurring. The probabilities are added based upon the rules of elementary probability that come into play when calculating the probability of the occurrence of one of a set of mutually independent events. Taking the minimum of the NPV_i s ensures a financially conservative approach to benefit estimate by producing the result of realizing the least of the target benefits with the highest probability.

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Let's illustrate the use of this approach with a quantitative example.

Assume that a given multiservice telephony network capital investment produces the following NPV investment results. Assume that the NPV_{base} benefit is $25,000 and that the following probabilities are assigned to each of the new distributed applications that are likely to be deployed on the network:

p_a = Branch-to-branch telephony services	25%
p_b = Branch-to-branch desktop videoconferencing	15%
p_c = Audio and video customer service call centers	35%

Also assume that these events are independent of each other. Adding all three probabilities together, the resulting probability is 75 percent that at least one of them will occur.

Now assume that the business NPV calculated for each of the independent investments is as follows:

NPV_a = $30,000
NPV_b = $20,000
NPV_c = $75,000

The probabilities are then multiplied by the lowest NPV of all the projects and added to the base of $25,000 as per the options model formula shown above, resulting in a NPV investment of $40,000:

$25,000 + (0.75 x $20,000) = $25,000 + $15,000 = $40,000

This discussion of the options model shows that the most effective investments may not always be those that deliver only one benefit (especially when that benefit is simply a cost-reduction benefit), but rather those investments that result in the ability to use the resultant infrastructure for multiple applications.

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