

THE BUSINESS CASE FOR VIDEOCONFERENCING

*Understanding the
Benefits, Costs, and Risks
of Videoconferencing
Over ISDN and IP*



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Wainhouse Research is an independent market research firm that focuses on critical issues in the multimedia communications, videoconferencing, teleconferencing, web conferencing, and streaming media fields. The company conducts multi-client as well as custom research studies, consults with end users on key implementation issues, publishes white papers, newsletters, and market statistics, and delivers public and private seminars as well as speaker presentations at industry group meetings.

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NOTE: The material presented in this report is based on both primary and secondary market data coupled with our professional interpretation of the facts. We believe that the basic information and recommendations presented in this study provide a basis for sound business decisions, but no warranty as to completeness or accuracy is implied. All market estimates and forecasts are those of the authors, except as noted. We welcome your comments on this report.



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Section 1: Overview

This report is intended to give the reader a broader understanding of the many issues surrounding the deployment of videoconferencing systems. We intend to outline as many features, benefits, and costs surrounding the use of videoconferencing and visual collaboration tools in the enterprise as possible, while at the same time giving due attention to the many human factors which both drive and inhibit the use of these communications technologies.

While interest in videoconferencing has been growing strongly in the past five years, the recent terrorist actions have caused an unprecedented increase in both curiosity and usage. While fear of flying or simple abhorrence of the long security delays now involved with air travel have been enough for many managers to turn to visual collaboration as an alternative to business travel, the fact remains that a careful consideration of the benefits of videoconferencing will lead to a fairly long list of hard and soft benefits. Many of these benefits are easy to quantify, while others are more difficult or obscure. Our goal in this report is to delineate as many of the real costs as possible and to match these against both the hard and soft benefits accrued by using today's visual collaboration tools. We also attempt to look at a few different applications and scenarios, and to investigate the tradeoffs between ISDN and IP networks that are also creating much interest.

This document includes detailed information about how to calculate such critical figures as the cost of business travel, the cost of using videoconferencing, and the yearly savings that a firm can expect by adopting videoconferencing. We hope this report will help managers understand the true risks and rewards associated with the technology, and perhaps spur more companies to deploy visual collaboration tools more widely and strategically within their organizations.

Introduction

Since its invention in the mid-80's, companies have struggled to justify the use of videoconferencing technology. Although virtually all companies agree that any business tool that saves time and money is worth considering, some companies are reluctant to adopt videoconferencing for a variety of reasons. Even companies that already use videoconferencing often have difficulty proving that their use of videoconferencing helps them achieve their corporate goals.

Although there are many reasons why justifying videoconferencing is so challenging, perhaps the most prominent reason is video's rather troubled past. Videoconferencing systems of the past were both expensive and unreliable. In other words, busy executives had to invest significant amounts of money to use an only somewhat-reliable business tool. In addition, many early videoconferencing users have suffered stress and embarrassment when technology issues forced them to interrupt, or even cancel a critical meeting. Fortunately, these problems are gradually disappearing.

The fact that a large percentage of videoconferencing users are recurring users says a great deal about the value and benefit package offered by the technology. Recurring users appreciate the time savings and the chance to meet face-to-face with their cohorts without having to leave their office. In contrast, non-users are often quick to explain that their business is too important to be dependent upon any electronic business tool, regardless of the potential cost and efficiency benefits.

Report Summary

As described in detail elsewhere in this document, the task of justifying the deployment of videoconferencing is not always easy. The analysis can be limited to hard costs and hard benefits. However, many of the benefits of conferencing are considered to be soft – that is they are harder to quantify for use in a numerical analysis. This doesn't make the

benefits unreal; it just makes them more difficult to measure, or when they are measured, the results are more subject to questioning.

Justifying videoconferencing can be challenging for a variety of reasons:

- Comparisons are made to business travel which offers face-to-face contact, formal and informal opportunities, and in many cases, glamour and ego satisfaction from the travel experience itself
- Audio conferencing is typically a lower-cost alternative
- Limited usage of videoconferencing equipment makes experience more rare
- Lack of available usage information hinders analysis
- Lack of accurate meeting cost information hinders analysis
- Many benefits from travel avoidance are soft benefits
- Lack of specific ownership of the videoconferencing justification task within the enterprise makes the problem and the rewards obtuse
- Budget approvers are not necessarily video users
- The purchase requires a significant investment (although declining)

One of the major roles of videoconferencing is that of a substitute for business travel. The act of converting a business travel meeting to a videoconference affords all participants both hard and soft benefits. These benefits include:

- Cost savings (avoided flights, hotel, car service, daily meals)
- Time savings (avoided flight time, waiting time, preparation and “down” time)
- Improved quality of family life and sometimes personal health
- Gaining ad-hoc access to contacts since a video call can be made with almost no advance notice
- Keeping staff in position where they are likely to be more effective
- Gaining the image of cost effectiveness and efficiency

Benefits of Videoconferencing Compared to Telephone Meetings

Converting an ordinary telephone discussion into a videoconference can often improve the effectiveness of the meeting. Specifics include:

- Increased impact and focus
- Enhanced persuasiveness
- Expedited development of trust and comfort

The availability of IP based videoconferencing is helping this industry overcome many of the problems related to ISDN based solutions. The benefits of IP videoconferencing include:

- Lower end-point costs since an ISDN interface is not needed
- Low (or non-existent) usage fees since many IP networks are sold on a fixed monthly price
- Free calls if the user wants to use the public Internet without quality of service guarantees (not recommended for general business use)
- Higher quality audio and video made possible by broadband connections
- Improved connection reliability
- Ad-hoc meeting convenience
- Dynamic bandwidth allocation (i.e. use only what you need)
- Network convergence; using a single network for voice, video, and data can lead to significant cost savings. (Running a separate or overlay IP network can also lead to significant savings over ISDN in many cases as well.)

An important part of justifying the use and investment in videoconferencing is the creation of accurate statistics and cost calculations including:

Cost Information

- The true cost of attending a travel meeting (hard and soft)
- The true cost of participating in a videoconference meeting

Savings Information

- The anticipated yearly savings of offered by using videoconferencing
- The anticipated yearly return on investments (ROI) in videoconferencing
- The anticipated break-even point (in months) on investments

Work Efficiency / Quality of Life Information

- The number of trips that can be avoided each year through videoconferencing
- The number of workdays that can be saved each year
- The number of nights away from home employees can avoid

The key to maximizing the return on investments in videoconferencing is to initiate activities to drive additional use of the technology. Since each meeting converted from travel to videoconferencing saves both time and money, converting more meetings yields greater savings and therefore increased the ROI.

Experience has shown that the most effective driver for the expansion of videoconferencing and visual collaboration within any organization is a top-down edit. By setting a realistic, and measurable goal for reduced travel expenses, or improved efficiency, or reduced time-to-market, or by visibly using the technology himself, a senior executive can drive the use of conferencing services and applications within the entire organization.

Avoiding Comparisons with Travel and the Telephone

One of the mistakes frequently made by videoconferencing managers is attempting to justify the use (and investment in) videoconferencing by positioning videoconferencing as a direct replacement for corporate travel. To make their case, these support managers play upon some of the well-known pitfalls and stress points related to business travel including high costs, delayed flights, and long wait times in airports. However, being so hypercritical of business travel tends to cause others to be hypercritical of videoconferencing, which results in discussions about failed video meetings, poor image quality, and the high cost of support managers and dedicated videoconferencing equipment. A better strategy is to position videoconferencing as a cost-effective addition to the arsenal of business tools (including web conferencing and audio conferencing as well as face-to-face in-person meetings) available to the organization. These managers concede that there are times when business travel is not only justified, but the most cost-effective and efficient way to achieve the goals of the organization. However, there are also situations when the cost and time investment necessary for business travel can, and should, be avoided through the use of conferencing technologies.

Another tempting trap that videoconferencing managers fall into is attempting to justify videoconferencing by highlighting the weaknesses of telephone meetings. Such discussions focus on the poor service offered by cell phones and the fact that telephone meetings can often be impersonal, unnecessarily long, and somewhat ineffective. However, people are so comfortable with the telephone that when confronted in this manner, they may become defensive. This diverts the discussion to the relatively high cost of videoconferencing and the fact that no other business technology has yet to achieve the reliability offered by the telephone. Once the discussion shifts in this manner, videoconferencing supporters have lost their battle. A better approach is to position videoconferencing as a more expensive but also more effective and interactive

venue for key meetings and sessions. Proponents should highlight the improved focus, trust building, and persuasiveness provided by videoconferencing's visual interaction.

Videoconferencing Can Justify Itself

The majority of companies that deploy videoconferencing will enjoy cost savings and a very fast break-even point for their investment. Therefore, the best way to justify videoconferencing is to market the benefits offered by this technology and to position videoconferencing as a complement to other business tools including business travel and audio conferencing.

In short, videoconferencing:

- Reduces travel costs
- Increases productivity
- Provides an intermediate step between a phone call and a face-to-face visit.
- Can involve multiple sites simultaneously
- Allows many people to interactively participate immediately
- Responds to immediate communication needs
- Provides a focused, precise, and concise communications tool; people don't waste time videoconferencing as they often do in face-to-face meetings
- Simplifies access to either mandatory or optional training
- Projects an up-to-date, new image for your firm
- Sets your firm apart from your competition
- Allows meetings to be video taped and archived easily
- Accelerates decision making and time to market
- Allows the transmission of graphic, written or computer-generated material

Section 2: Justifying Videoconferencing

General Issues

The issues surrounding the deployment of videoconferencing in business include a fascinating variety of technical, human, and political factors that play widely divergent roles in different enterprises. Some of the examples we have observed include:

- The large multinational corporation that has deployed room videoconferencing systems, but only in a small percentage of their conference rooms. Use is limited to senior managers, almost all of whom rely on a “technical expert” to launch their calls.
- The enterprise that has investigated videoconferencing but decided the technology offers them limited benefits compared to the necessary investment and has therefore not deployed.
- The government agency that has deployed both room and desktop conferencing widely and expects everybody to be able to operate the equipment themselves, although a small central staff provides continuing technical support.
- The financial institution that has deployed over a hundred room systems successfully and is now trying to understand how to roll out over ten thousand desktop systems to make video calls as commonplace as voice calls.

We believe that an enterprise considering the deployment of videoconferencing and visual collaboration solutions needs to understand that there are long term benefits to be gained across multiple dimensions, but that there is also an “energy barrier” or hurdle that must be overcome as the equipment and network infrastructure are purchased, installed, set up, debugged, and ultimately maintained.

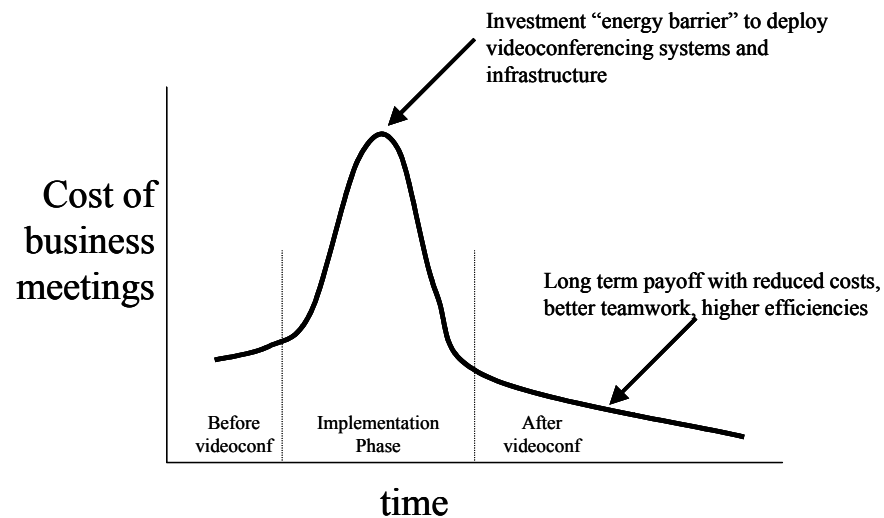


Figure 1 Overcoming technology hurdle can lead to more efficiency

Our diagram attempts to depict that business meetings become more expensive over time as the cost of airline travel increases and the cost of lost productivity rises. While there is a cost to deploy conferencing technologies across the enterprise (the implementation barrier or hurdle), after the hurdle is crossed, enterprises should be able to reap the rewards of ever decreasing costs associated with meetings. Another contributor to the implementation hurdle might really be deemed post-implementation tasks including promoting, supporting, and training staff on the proper use of the application and equipment.

Some enterprises today are uncertain about the future of network services and how these may affect the videoconferencing industry. During the 1990's, the vast majority of equipment deployed used the public circuit-switched ISDN network. ISDN is generally more available and less expensive outside North America than inside, and over the past decade vast improvements have been made in the reliability, availability, and pricing of ISDN circuits throughout the world. On the other hand, Internet Protocol, or IP, is a packet switched technology designed for data networks that has enjoyed mass-adoption thanks to the emergence and popularity of the Internet. Using IP networks for visual collaboration is becoming more popular because it holds the promise of improved performance and lower costs. However, IP networks are not designed for delay sensitive applications such as real-time voice and video communications. Therefore, IP networks need certain technology enhancers to perform well for business communications. Nevertheless, it is worth pointing out that virtually all the room videoconferencing systems shipped for the past 2-3 years support both ISDN and IP networks, which means that the fear of picking the wrong network should not be a factor in making the decision to roll out videoconferencing systems.

Most companies that have deployed videoconferencing have done so with enterprise group systems – products designed for installation in meeting and conference rooms and to be shared by groups of users. Indeed, this is still the most popular form of conferencing today. However, personal conferencing products designed for a single individual's use also exist. Many of these are PC add-on products (cameras, microphones, compression engines, etc.) but some of them are stand-alone videophones. Despite their low cost compared to room systems, desktop or personal systems have yet to be deployed in large numbers by many companies because they highlight problems in LAN and WAN capabilities and could tax already overburdened internal technical resources.

Another issue is that many people are just not comfortable in front of a camera. They cringe at the sight of themselves on the video screen and think they don't look their best during video calls. In addition, many users perceive the installation of a camera in an office or cubicle as a privacy infringement. Furthermore, many offices and workspaces are not equipped with the lighting and acoustic elements that can optimize a personal videoconferencing experience.

Another consideration is that compared to a voice call, a video call is far more demanding on the participants. It is nearly impossible to be on a personal video call and also scan the newspaper, read email, or tidy up one's office. This means that rather than being a liberating experience, personal videoconferencing is often perceived as an 'enslaving' experience. (So too are person-to-person meetings many times.)

Many of these technical and human factors vary widely between companies. When looking at the issues of deploying, accepting, and understanding the return on investment from both room and personal conferencing systems, we believe enterprises can be viewed as fitting into one of four quadrants. Our matrix "the depth of deployment" allows us to characterize the depth of penetration of videoconferencing within an organization. For example, we would characterize a company with 25 group conferencing systems but 1000 conference rooms as having a "low" penetration depth. Similarly, we would characterize a deployment of 50 desktop systems in a company or department with less than 100 workers as having a high depth of penetration. It should be mentioned that very few enterprises today would qualify as having a high depth of penetration for personal conferencing systems (i.e. desktop systems), although we are aware of several organizations considering aggressive deployments in this space over the next 12 – 18 months.

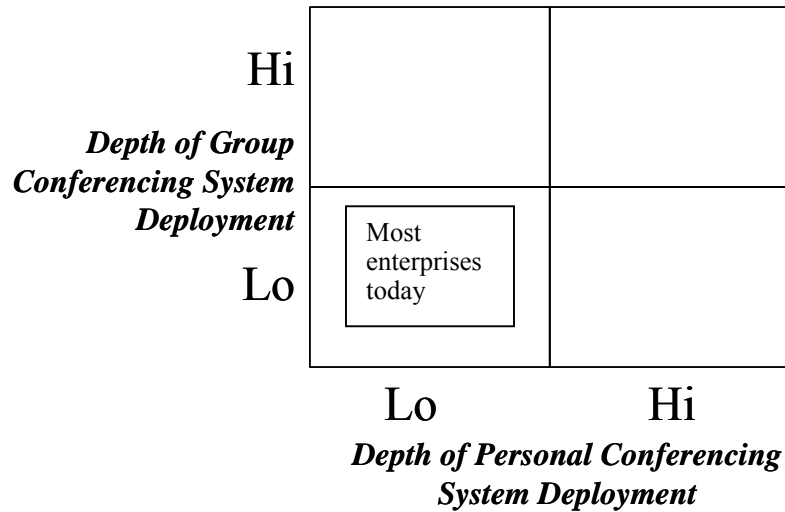


Figure 2 Enterprise matrix for conferencing deployment

Most companies today have a higher penetration depth for group systems than they do for personal conferencing systems; indeed most organizations have a higher *number* of group systems than they do personal systems, even though they have more offices than they do conference rooms. In addition, we are aware that some companies see themselves as promoting a “team” environment, which often promotes the use of common conference rooms for meetings and for collaboration sessions with remote groups of colleagues.

The Challenges of Justifying Videoconferencing

Video vs. Travel

As described in the overview section of this document, the most obvious and easily understood benefit of videoconferencing is that videoconferencing allows users to participate in ad-hoc, face-to-face meetings with geographically dispersed attendees without the cost, stress, and time investment of business travel. Therefore, it is logical for users to compare videoconferencing meetings to business travel meetings. However, a top level comparison of videoconferencing to business travel rarely results in favor of videoconferencing. The reasons many users tend to favor business travel include:

Travel Is Not Just An Activity, It Is A Behemoth – A huge number of people work in the global travel industry. In addition, in most large companies, the resources working in the corporate travel department greatly outnumber those working in the videoconferencing support groups. In addition, the amount of money spent on corporate travel far exceeds that spent on videoconferencing. For these reasons, travel managers tend to hold more corporate clout than the video team, which has a strong impact on the corporate travel policies and the approval process for investments in videoconferencing.

Travel Is Not An Unknown – Virtually all business people are personally familiar with the benefits of business travel. Either they themselves are business travelers, or their managers and colleagues are business travelers. However, the majority of people have not participated in a videoconferencing meeting. Therefore, videoconferencing remains an uncomfortable unknown to many staff members.

Travel Is Both Business and Private – Because of the relatively high cost of videoconferencing equipment and the necessary data lines, videoconferencing at this time is primarily a business only tool. However, travel translates easily into people’s private lives. Thoughts of travel makes people think about their last, and perhaps their next

vacation or opportunity to visit their friends and loved ones. In short, for many people travel is a part of a pleasant and personal event while videoconferencing is a part of work and business.

Travel Rewards Frequent Travelers – In an effort to compensate inconvenienced travelers and to reward frequent customers, airlines and hotels often provide customers with gifts or rewards. These items of creative compensation include free trips, flight / seat upgrades, free hotel nights, discounts on future travel, and personal pampering such as entrance to business lounges. Videoconferencing, on the other hand, offers no such perks other than the knowledge that the individual is saving time and money.

The Travel Industry Understands Marketing – The travel industry spends a great deal of money on marketing the benefits and “fun” involved in both personal and business travel. This marketing includes television ads, radio commercials, newspaper and magazine promotions, and more. This generates a great deal of awareness and helps existing and potential customers feel more comfortable initiating travel plans. The videoconferencing industry, on the other hand, is comprised of smaller companies that don’t have the marketing budgets to aggressively promote their products and solutions.

Video vs. The Telephone

Virtually all users of videoconferencing agree that video meetings are more effective than telephone only conferences. As described previously, many support managers try to justify the investment in and use of videoconferencing by comparing video to the telephone. Unfortunately, initiating such a battle does not always yield positive results for some of the following reasons:

Massive Deployment – In almost any country around the world, a person can buy a telephone quite inexpensively. Even the previously expensive wireless phones are now available for a fraction of their initial cost. This low cost and global availability has led to the massive deployment of telephones around the world. However, videoconferencing systems remain relatively expensive and therefore deployments to date have been limited. This means that even if a person or organization does invest in videoconferencing, it is possible (and even likely) that they will not be able to reach all of their business contacts via video. Sometimes called the “who are you going to call?” syndrome, this is not an issue with the telephone.

Everyone Is A User – Thanks to a global and massive deployment, virtually everyone around the “civilized” world uses the telephone. This has led to a high level of comfort with the telephone, and leads people to choose the telephone as a primary communication tool.

Simple User Interface – In its basic form, using a telephone involves only picking up the handset and dialing a telephone number. There are no menus to traverse, no options to select, and no configuration to complete. In fact, the telephone is a product you can use without even reading the user manual. However, using a videoconferencing system involves a series of menus and a variety of options and settings. In addition, a typical videoconferencing system ships with a long and complex user manual. This has slowed the deployment of video.

Phenomenal Reliability – Telephone systems used by enterprise organizations and telephone companies offer an amazing level of reliability. Often called the five nines of reliability, these systems offer up to 99.999% up-time and therefore it is quite rare that a telephone user cannot use their telephone. Videoconferencing, unfortunately, cannot match the reliability offered by the telephone. For this reason, people often avoid depending upon videoconferencing as a key business tool.

Low Usage Costs – In the enterprise environment, it is not unusual for organizations to pay only 2 or 3 cents per minute for long distance telephone calls. This translates into an

hourly usage cost of less than \$2. However, videoconferencing usage tends to be much more expensive because of the bandwidth required to complete a call. Although videoconferencing does offer many benefits that more than justify the additional expense, many users limit their comparison to investment and usage costs only.

Limited Experience

One of the most difficult challenges facing proponents of videoconferencing is the limited use and deployment depth of videoconferencing technology. Reasons for this include:

Travel's Benefits Are Clear – Business travel has long been, and will likely remain a key part of everyday business. The benefit of having face-to-face contact with colleagues and other contacts combined with the excitement of new experiences, the “creative” perks (as described previously), and the break from the monotonous pace of the workplace prompts some executives to seek out travel opportunities. For these reasons, some people – and even some organizations – choose not to deploy videoconferencing regardless of the benefits it offers.

Lack of Awareness – Videoconferencing departments inside organizations often do not have the resources to promote their solutions widely inside the enterprise, thereby limiting the exposure of videoconferencing throughout the user community and limiting the potential savings.

Convenience and Availability – The multi-location nature of video meetings increases the complexity involved in coordinating a videoconference. In some organizations, reserving a video meeting requires several phone calls, faxes, e-mails, and follow-up activities to multiple support groups. However, a phone call requires little or no prior planning. In addition, the deployment depth of videoconferencing remains light in many companies. Therefore, even if a person wishes to reserve a videoconference, it is possible (and in some cases even likely) that a suitable room may not be available at a convenient time.

Limited Key Performance Indicators (KPIs) – Decision makers within most organizations depend heavily upon cost-savings and payback calculations before making investment decisions. Unfortunately, most videoconferencing systems deployed today do not provide a record of call volume and usage. Since savings and payback calculations are derived from usage information, the only way to derive such figures is to manually track each and every use of the equipment and the realized savings. Because this would necessitate assigning additional staff, most organizations do not generate these manual statistics, and therefore, decision makers are not given the benefit of accurate hard benefit calculations.

Fortunately, videoconferencing system manufacturers have addressed this problem and current video systems do allow usage information to be downloaded and archived. Therefore, this issue should disappear in the next few years.

Too Many Soft Benefits – As described previously, many (if not the majority) of the benefits offered by videoconferencing are soft benefits. These benefits include significant timesavings, improved quality of life, and improved effectiveness of meetings. Such benefits, unfortunately, are difficult to quantify and therefore people tend to ignore or downplay the importance of these benefits when considering investments in video technology.

Approvers Don't Understand The Benefits – In most organizations, only a small minority of executives have first-hand experience with videoconferencing. Therefore, it is likely that the managers and executives charged with approving requested investments in videoconferencing do not truly understand the benefits that such an investment would generate.

Relatively High Buy-In – Unlike the telephone and business travel, organizations must make a fairly significant and long-term investment in videoconferencing technology before they can place even their first video call. Furthermore, the necessary investment often includes the hiring of specialized support personnel or re-deployment of existing internal resources. This high sticker price causes some companies to avoid videoconferencing.

Stress - Because all participants can see each other during a video meeting, these meetings tend to be more directed, focused, and formal. Although this does improve efficiency, it can prove stressful to some people.

Video Can Be Uncomfortable – During non-video meetings, attendees are not able to see themselves as others see them. However, during a videoconference, participants can always see themselves by using the preview or self-view function. Some people, and especially people who are not comfortable in front of any camera, find this self-view to be disconcerting and therefore are uncomfortable during video meetings.

Video's Troubled Past - As discussed previously, videoconferencing meetings do not provide the level of reliability offered by the telephone. Unfortunately, many business executives have experienced videoconferencing problems first hand and still recall the resulting stress and embarrassment. Although these types of problems have become uncommon, there are people who were so significantly impacted by prior issues that they still avoid using videoconferencing. In addition, such people may influence others in their organization, especially their subordinates, to avoid using video.

Confidentiality Issues – The benefits offered by videoconferencing makes it a logical choice for busy executives and critical meetings. However, the technology required for a videoconference (cameras, microphones, etc.) causes some people to suspect that their meetings are being recorded or re-broadcast to non-participating parties. This leads some people to avoid using videoconferencing for confidential discussions, even when video would be the most cost-effective and efficient venue for the session.

Section 3: Videoconferencing as a Travel Alternative

Overview

Perhaps the most common use for videoconferencing is as a substitute for business travel, even though, as detailed elsewhere, many business executives either find their own rewards in travel or believe fervently that travel is an absolute necessity to accomplish their business goals. Nevertheless, many managers are quite successful at promoting videoconferencing as an effective, time efficient, and cost saving alternative to business travel. WorldCom has conducted numerous studies on "Meeting's in America" and we've included some of their results here.

Time Savings

The potential for saving time is one of the most convincing reasons to use videoconferencing. In fact, the time saving benefits often outweigh the direct cost savings offered by videoconferencing.

According to the WorldCom study, to participate in a typical domestic travel meeting, an employee must invest 21 hours in flying time, driving time, meeting preparation time, the meeting itself, and associated follow-up efforts. However, the study further indicates that the same employee participating in a typical videoconference meeting would need to invest only 4 hours of their time. Hence, by converting a travel meeting to a videoconference, each meeting participant can save approximately 17 hours. (We are aware that some people are able to use some of this travel time to accomplish some work-related tasks through the use of laptops, PDAs, and other tools.)

The same study documents that the average meeting includes five employees, four of whom need to travel to attend the meeting. Since converting this meeting to video would allow four employees to avoid business travel, converting this one travel meeting into a videoconference can save a total of 68 hours of employee time.

In addition, and according to this study, the average traveler attends 4.6 remote business meetings per month. This means that should the "average" employee choose to change 50% of their business trips into videoconference meetings, they can save 39.1 hours per month. This can also be viewed as a 20% increase in effective work time.

The fact that international travel meetings typically involve longer flights, longer waiting times in airports, and longer stays indicates that the potential time savings for international meeting conversions exceeds those of domestic travel meetings.

Cost Savings

Videoconferencing offers many benefits, including significant cost savings thanks to its cost-avoidance aspects. Specifically, by converting a travel meeting into a videoconference, organizations can realize both hard savings (flights, hotel, etc.) and soft savings (saved employee time).

According to the WorldCom survey, the average domestic business trip has a hard cost of \$1,334 per meeting participant. For arguments sake, we have assumed that the average business traveler's annual compensation is US \$80,000 and that the company pays an additional 25% for benefits. This yields an hourly employee cost of approximately \$50.

As described in the previous section, whenever an employee converts a domestic travel meeting into a videoconference meeting, they save an average of 17 hours. At \$50 / hour, this yields a savings of \$850 in soft costs (time) per participant, per converted meeting. By combining the hard cost and soft cost savings, we find that a total of \$2,184 can be saved per employee. Applying this savings calculation to all traveling meeting participants reveals that converting the average business travel meeting to a

videoconference allows an organization to realize a savings of more than \$8,000 per meeting.

Quality of Life

Clearly the financial motivators for investing in videoconferencing receive the most attention from corporate decision makers. However, many employees consider some of the other soft benefits offered by videoconferencing to be more important.

During the 2000 International Symposium On Stress, detailed information was presented regarding the stresses involved in corporate business travel. Their studies revealed that more than 73% of business travelers find general business travel to be a source of stress. In fact, more than half of that 73% reported that business travel is extremely stressful and that it negatively impacts their life, their sleep, their well-being, and their general performance both before and after their journey.

Presentations during this symposium further revealed that business travel is not only stressful on the business traveler, but on their family as well. In fact, almost 100% of spouses / significant others report that business travel has a negative impact on the stability and happiness in their family life.

Another interesting item revealed during this symposium is that 76% of business travelers report that they suffer from more health problems when they travel. On a related note, a World Bank Survey reported that frequent business travelers are 3 times more likely to use their corporate health insurance program for mental health treatment.

By allowing employees to limit / avoid business travel, videoconferencing helps decrease stress, improve family relations, avoid health problems, and potential mental health issues. In short, using videoconferencing can have a significant positive impact on an employee's quality of life.

Improved Access to Clients and Colleagues

One reason people turn to videoconferencing is to gain immediate, ad-hoc and fully interactive access to their contacts, regardless of their respective geographical location. Although a telephone call does, to some degree, allow remotely located contacts to communicate, it cannot provide the face-to-face capabilities offered by video.

Travel, on the other hand, is hardly ever ad-hoc, and even when it is, there is almost always significant time that elapses between when one decides to travel and when one appears face-to-face with the colleague or client. With videoconferencing, a user can be "in front" of a client in minutes after making the decision to do so.

Image of Efficiency

Today's competitive business environment demands that organizations and their partners operate as efficiently and effectively as possible. The fact that an organization uses a cost and timesaving technology such as videoconferencing makes a strong statement about the priorities and operating habits of that company. Gaining a reputation for being cost-conscious and resourceful can only yield positive reactions from employees, partners, and even shareholders.

Minimizing Employee Downtime

"Downtime" is the time period that an employee is not able to work on achieving corporate goals. Clearly, minimizing downtime can have a positive effect on the performance and efficiency of an employee and an organization.

When considering business travel, downtime includes the time driving from the office to the airport, the time waiting to board the flight, and the time spent driving from the

airport to the final destination. In addition, the results of a recent Harris Survey conducted for Delta Airlines indicate that even the time spent on the airplane during the flight should be considered downtime. This survey showed that only 5 percent of business travelers actually consider themselves “work focused” during flights. According to this survey, instead of working while flying, 81% of travelers read for pleasure, 64% relax or even sleep, and 55% either watch the in-flight movie or partake in the on-board entertainment system (i.e. play video games).

As described above, each and every business trip results in a significant amount of employee downtime. However, by allowing employees to minimize their travel, videoconferencing helps organizations minimize employee downtime.

Payback Calculations – Medium / Large Enterprise

Before presenting our first cost model, it is important to note that it is impossible to create a specific example that will be of universal applicability due the number of options and variables involved. For example, the decision whether to use ISDN or IP based videoconferencing can have significant impact on the related financials. In addition, some companies are in a position to leverage their existing network infrastructure for videoconferencing while other firms will need to significantly upgrade or even deploy an entirely new network. The level of network enhancement needed to deploy videoconferencing will also have a major impact on the savings and payback calculations.

Another noteworthy item is that network installation and monthly fees vary depending upon location, bandwidth required, and network provider. Therefore, the cost of a 2MBit IP data pipe for one company may be more or less than the cost for another firm. Furthermore, the decision whether to in-source or out-source the video bridging function will also influence the cost basis, and therefore the fiscal performance and ROI. For these reasons, the examples we provide in this report should be used as a general guideline for necessary company specific calculations.

The examples provided in this report have been designed to highlight the fact that different assumptions can have a significant affect on the financial picture. Even seemingly small changes, such as hourly long distance rates or the number of meetings attended each month, can radically alter the financial curves.

Example 1:

This example considers a medium sized organization with a central headquarters and ten remote sites. These remote sites are perhaps smaller sales sites or technical support offices. In this example, we assume that each site manager returns to the central headquarters twice a month to participate in two hours of management meetings. A summary of the relevant input data is shown below.

General		Video	
# of Travelers	10	# of Video Systems	11
Average Cost / Trip (US \$)	\$1,200	Initial Cost	\$120,000
# of Meetings / Month	2	Annual Maintenance %	10%
Meeting Length (hrs)	2	Management Cost / Mon (US\$)	\$7,000
Round Trip Travel Time (hrs)	7	BRI – Fixed Fee / Month (US\$)	\$150
Non Productive Meeting (hrs)	0.5	ISDN – Usage Fee / Hour (US\$)	\$50
Pre and Post Travel Time (hrs)	2	Bridging Fee / Hour (US\$)	\$60
Average Annual Salary	\$100,000	% of Meetings Converted to VC	40%
Overhead % (Benefits, etc.)	33%		

Figure 3 Videoconferencing-travel cost model for medium sized corporation

Description of General Assumptions

In the above example, we have assumed that 10 employees travel to each of these meetings (one employee from each of the remote offices traveling back to HQ for each

meeting). Each trip has a total hard cost of \$1,200 including flight, hotel, car service, meals, per-diem, and other incidentals. In terms of soft costs (i.e. time), we assume that the actual flight requires seven hours round trip, and that the travel to and from the airport takes another two hours. In addition, we estimate that the employee needs to invest ½ an hour to coordinate the logistics of their trip (flight reservations, hotel reservations, car service / car rental, etc.). As shown above, we estimate the salary of each traveler to be \$100,000 per year, not including an additional 33% overhead for benefits and retirement plan. By adding the hard and soft costs together, we arrive at the total cost per person for participating in a travel meeting.

Description of Video Assumptions

In this example, we have assumed that the initial cost for installing the eleven videoconferencing systems (one per office), including the necessary ISDN network connections, is \$120,000. Depending upon the type and model of equipment deployed, this figure may be a low or high estimate. In addition, the company will pay 10% of the initial purchase and installation cost each year for an annual maintenance contract. Furthermore, we assume that the company will hire a videoconferencing system manager at a fully loaded cost of \$7,000 per month (including benefits). We estimate the fixed monthly cost of 3 ISDN lines (allowing 384k videoconferencing quality at each location) to be \$150. In addition, we anticipate hourly long distance (ISDN usage) fees of \$50 and hourly bridging fees of \$60 per participating site. Finally, we assumed that the company would convert 40% of their travel meetings to videoconferencing.

The chart on the next page shows the hard cost of travel (H-travel), the combined hard and soft cost of travel (H+S), and the cost after deploying videoconferencing (VC), assuming that the given percentage of meetings are converted from travel meetings to VC meetings (not all meetings are converted; in this case we assume only 40%).

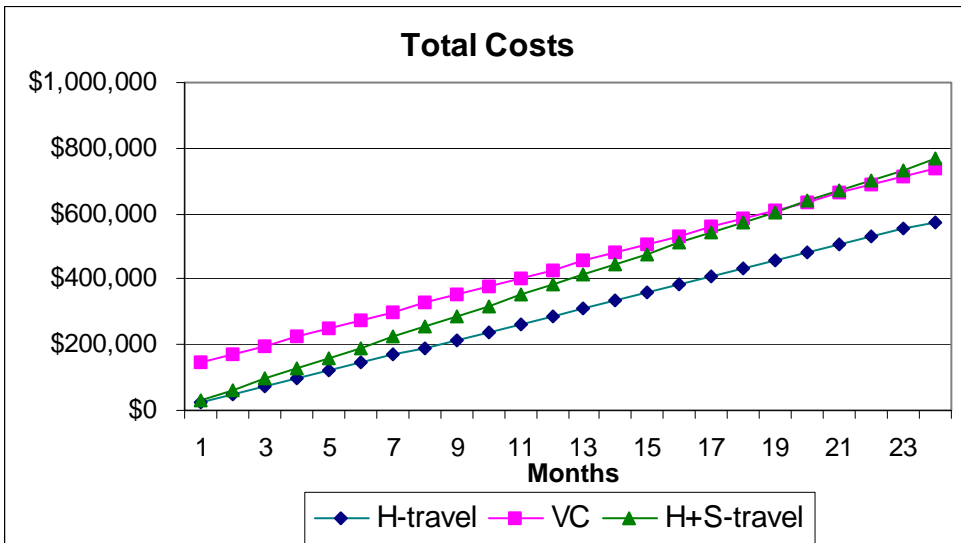


Figure 4 Total cost calculations for example 1

As can be seen from the diagram, in this light-usage situation, comparing the costs of videoconferencing with only the hard costs of travel makes it extremely difficult to justify the cost of the videoconferencing investment. However, by including both the hard and soft costs associated with travel, a payback on the investment can be calculated to occur in month 20. Note that this scenario assumes that the videoconferencing equipment will be used for less than 1 meeting per month (the company has 2 meetings per month, but converts only 40% of these meetings to video). In other words, even though the video system will be in use for less than 2 hours / month and will remain idle

for more than 99% of the time, the organization can expect a 100% payback for their investment in approximately 20 months.

Another way of looking at these figures is that the savings generated by converting travel meetings to videoconferencing is directly dependent upon the number of travelers within the firm, the frequency of their travel, and the percent of their meetings that will be converted to video. At low equipment usage rates (i.e. a limited number of travelers, a limited number of meetings, or a small conversion rate from travel to video), it becomes difficult or impossible to realize a savings. The equipment is simply too underutilized to pay for the investment and recurring costs involved. The following chart shows calculations for three group sizes and different conversion-to-video rates.

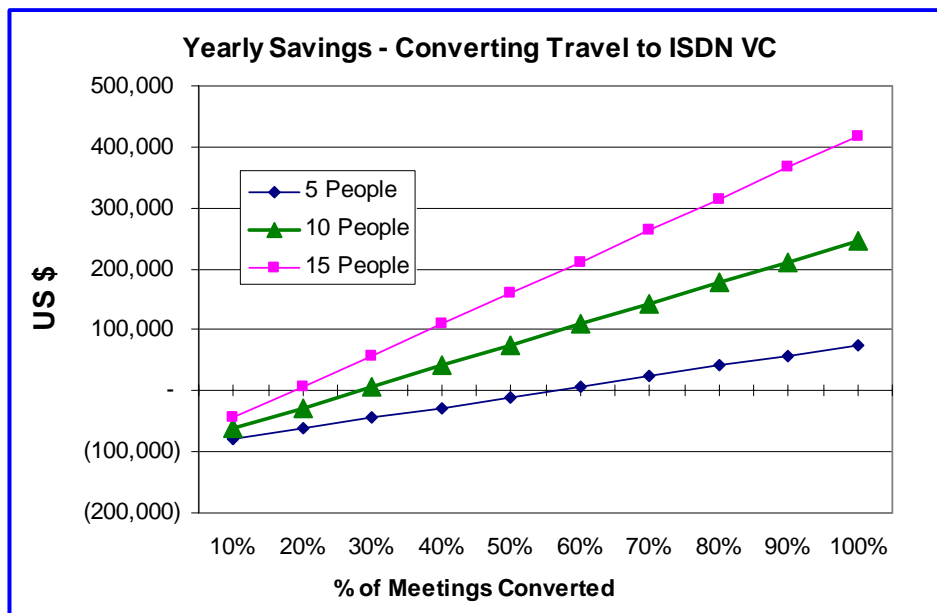


Figure 5 Yearly savings as function of meetings converted, example 1

Example 2: Increased Number of Meetings

Based on the original set of assumptions, the results change dramatically if we assume that a total of four meetings per month are conducted with the same 40% conversion rate. In this case, perhaps the sales and technical support departments will also use the videoconferencing equipment. The table below shows the assumptions related to this example.

General		Video	
# of Travelers	10	# of Video Systems	11
Average Cost / Trip (US \$)	\$1,200	Initial Cost	\$120,000
# of Meetings / Month	4	Annual Maintenance %	10%
Meeting Length (hrs)	2	Management Cost / Mon (US\$)	\$7,000
Round Trip Travel Time (hrs)	7	BRI – Fixed Fee / Month (US\$)	\$150
Non Productive Meeting (hrs)	0.5	ISDN – Usage Fee / Hour (US\$)	\$50
Pre and Post Travel Time (hrs)	2	Bridging Fee / Hour (US\$)	\$60
Average Annual Salary	\$100,000	% of Meetings Converted to VC	40%
Overhead % (Benefits, etc.)	33%		

Figure 6 Assumptions for example 2, 4 meetings/month

In this situation, the cost of videoconferencing will increase slightly because the ISDN usage has increased. However, all travel related costs will double. In this case, the

breakeven point when considering hard cost savings only is 20 months. However, and more significantly, the breakeven point decreases to only six (6) months when both the hard and soft costs are considered.

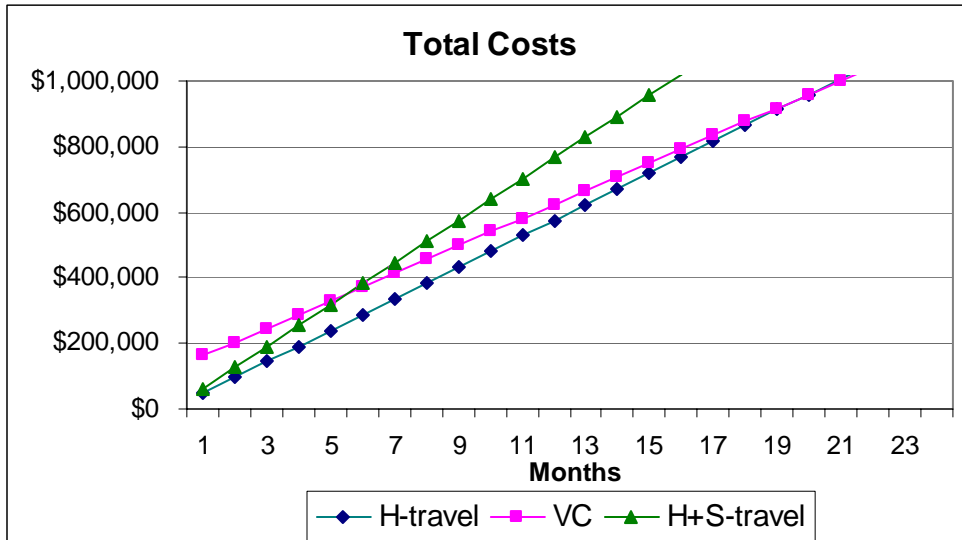


Figure 7 Total cost calculations for example 2

Example 3: Decreased Average Trip Cost

For many companies, the assumed average trip cost of \$1,200 is not applicable. Therefore, in this example, we've decreased the average trip cost to \$400. The number of meetings per month remains at 4 with a 40% conversion-to-video rate. The table below highlights the assumptions used in this example.

General		Video	
# of Travelers	10	# of Video Systems	11
Average Cost / Trip (US \$)	\$400	Initial Cost	\$120,000
# of Meetings / Month	4	Annual Maintenance %	10%
Meeting Length (hrs)	2	Management Cost / Mon (US\$)	\$7,000
Round Trip Travel Time (hrs)	7	BRI – Fixed Fee / Month (US\$)	\$150
Non Productive Meeting (hrs)	0.5	ISDN – Usage Fee / Hour (US\$)	\$50
Pre and Post Travel Time (hrs)	2	Bridging Fee / Hour (US\$)	\$60
Average Annual Salary	\$100,000	% of Meetings Converted to VC	40%
Overhead % (Benefits, etc.)	33%		

Figure 8 Cost assumptions with low cost travel

In this example, and as shown in the graph, this company's break even against hard and soft travel costs occurs in month 14, although the breakeven against hard travel costs alone never occurs.

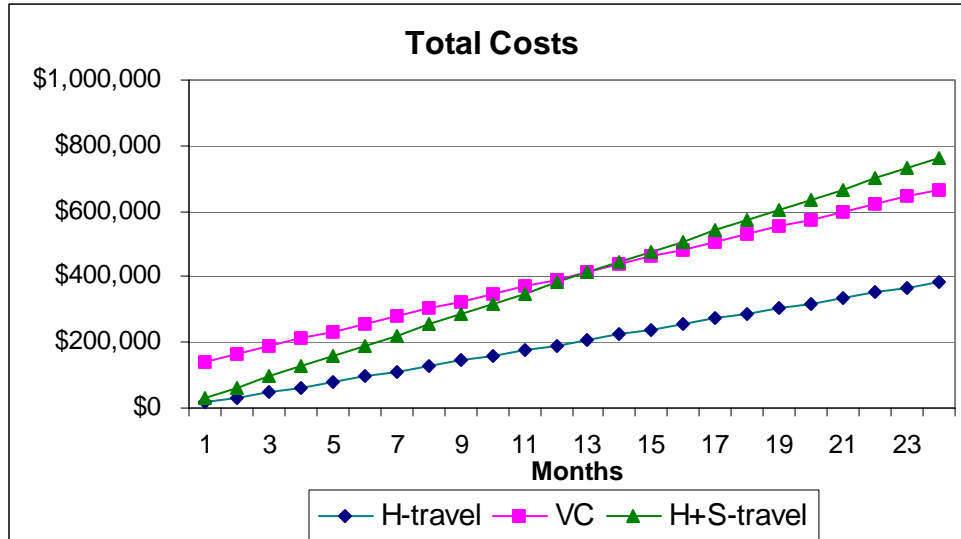


Figure 9 Breakeven costs assuming low cost travel, example 3

Example 4: Increased Average Trip Cost & Decreased Conversion Percent

Another interesting scenario involves increasing the average trip cost to \$1350, which is more in line with the travel industry’s estimate of the actual cost of business travel. However, in this example the conversion rate is decreased to a mere 10% of the possible meetings.

General		Video	
# of Travelers	10	# of Video Systems	11
Average Cost / Trip (US \$)	\$1,350	Initial Cost	\$120,000
# of Meetings / Month	4	Annual Maintenance %	10%
Meeting Length (hrs)	2	Management Cost / Mon (US\$)	\$7,000
Round Trip Travel Time (hrs)	7	BRI – Fixed Fee / Month (US\$)	\$150
Non Productive Meeting (hrs)	0.5	ISDN – Usage Fee / Hour (US\$)	\$50
Pre and Post Travel Time (hrs)	2	Bridging Fee / Hour (US\$)	\$60
Average Annual Salary	\$100,000	% of Meetings Converted to VC	10%
Overhead % (Benefits, etc.)	33%		

Figure 10 Cost model with increased travel, lower meeting conversion rate

The breakeven curve for the above assumptions is shown below.

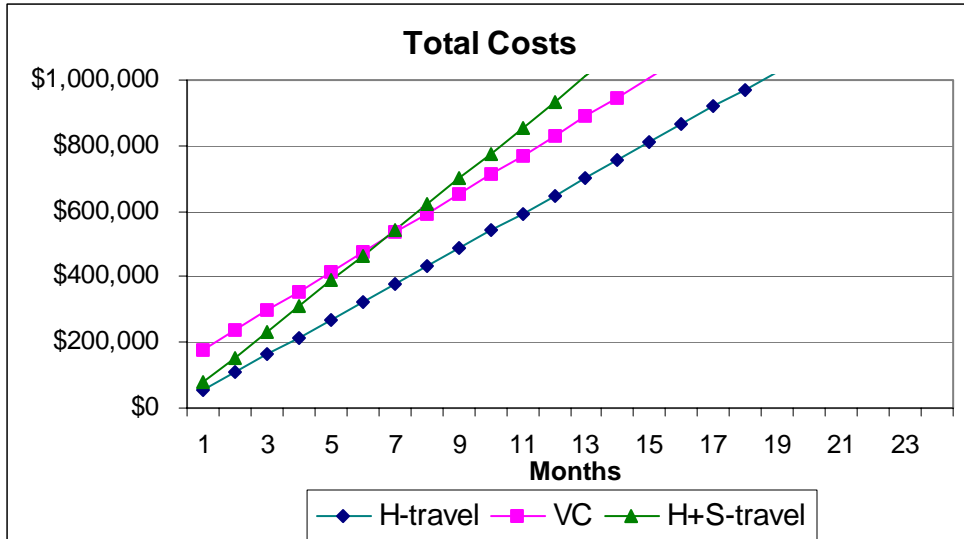


Figure 11 Breakeven analysis for example 4

As shown in this curve, the breakeven when considering both the soft and hard costs associated with business travel occurs in the 6-7 month time frame. (In fact, it is interesting to note that even with the number of meetings per month dropped to 3, breakeven occurs in less than one year.)

The table below shows the breakeven time (B/E - in months) for different combinations of meeting conversion rates, number of meetings per month, and average trip cost.

Meetings Converted to VC	40%	80%	40%	80%
Total # Of Meetings / Month	4	4	2	2
Actual # of VC Meetings	1.6	3.2	.8	1.6
Average Trip Cost	B/E	B/E	B/E	B/E
\$600	10 months	16	>36	>36
\$800	8	9	>36	>36
\$1,000	7	6	27	22
\$1,200	6	5	20	14

Figure 12 Breakeven table for converting meetings to videoconferencing

As shown in this table, by converting 40% of their meetings to videoconferencing, and assuming their travel costs are above \$600 per trip (which is less than half the average reported by the travel industry), this company will enjoy a breakeven of less than 1 year on their investment in videoconferencing.

Payback Calculations – Small Enterprise

Videoconferencing can also make a great deal of sense for a small enterprise.

Example 5:

In this example, we consider a company that has two main facilities located between 500 and 1000 miles apart. The table below illustrates our assumptions.

General		Video	
# of Travelers	1	# of Video Systems	2
Average Cost / Trip (US \$)	\$500	Initial Cost	\$30,000
# of Meetings / Month	4	Annual Maintenance %	10%
Meeting Length (hrs)	2	Management Cost / Mon (US\$)	\$1,500
Round Trip Travel Time (hrs)	6	BRI – Fixed Fee / Month (US\$)	\$150
Non Productive Meeting (hrs)	0.5	ISDN – Usage Fee / Hour (US\$)	\$50
Pre and Post Travel Time (hrs)	1	Bridging Fee / Hour (US\$)	\$0 (N/A)
Average Annual Salary	\$80,000	% of Meetings Converted to VC	100%
Overhead % (Benefits, etc.)	33%		

Figure 13 Assumptions for small enterprise cost model

As shown above, we have taken liberty with some assumptions. Total travel cost, for example, including airfare, car rentals, and car service / taxis is now only \$500. In this example, we assume minimal per diem and zero hotel costs since the distance between the offices allows for single day (no overnight) trips. The travel time has been reduced accordingly, which drastically lowers the soft costs of travel. We assume that the company has invested in two high end room systems, each equipped for heavy collaboration. Considering that only two systems have been deployed, we've decreased the management costs to those incurred by a single individual devoting only 20% of their time to videoconferencing management.

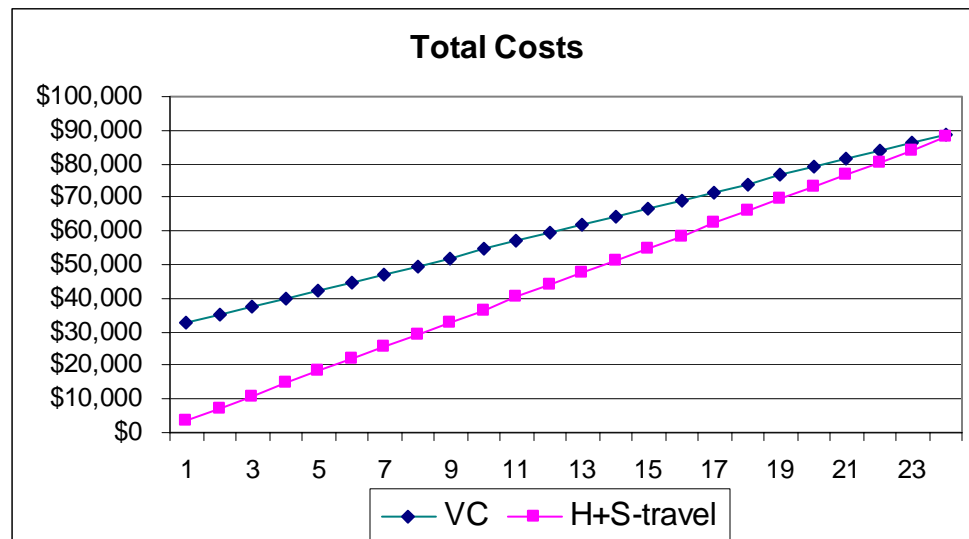


Figure 14 Breakeven analysis for small enterprise model, example 5

Due to the high initial systems cost and the extremely low assumed cost of travel, breakeven takes approximately 24 months assuming only 4 meetings per month and only one business traveler per meeting.

Example 6: Lower Initial Investment & More Meetings

A slightly different picture emerges if we are more cost conscious on the acquisition and if the number of meetings per month that are replaced by videoconferencing is increased to six. These assumptions are illustrated in the table below.

General		Video	
# of Travelers	1	# of Video Systems	2
Average Cost / Trip (US \$)	\$500	Initial Cost	\$24,000
# of Meetings / Month	6	Annual Maintenance %	10%
Meeting Length (hrs)	2	Management Cost / Mon (US\$)	\$1,500
Round Trip Travel Time (hrs)	6	BRI – Fixed Fee / Month (US\$)	\$150
Non Productive Meeting (hrs)	0.5	ISDN – Usage Fee / Hour (US\$)	\$50
Pre and Post Travel Time (hrs)	1	Bridging Fee / Hour (US\$)	\$0 (N/A)
Average Annual Salary	\$80,000	% of Meetings Converted to VC	100%
Overhead % (Benefits, etc.)	33%		

Figure 15 Small enterprise example with increased usage

As one might expect, increasing the utilization of the system results in a much faster breakeven of only 9 months.

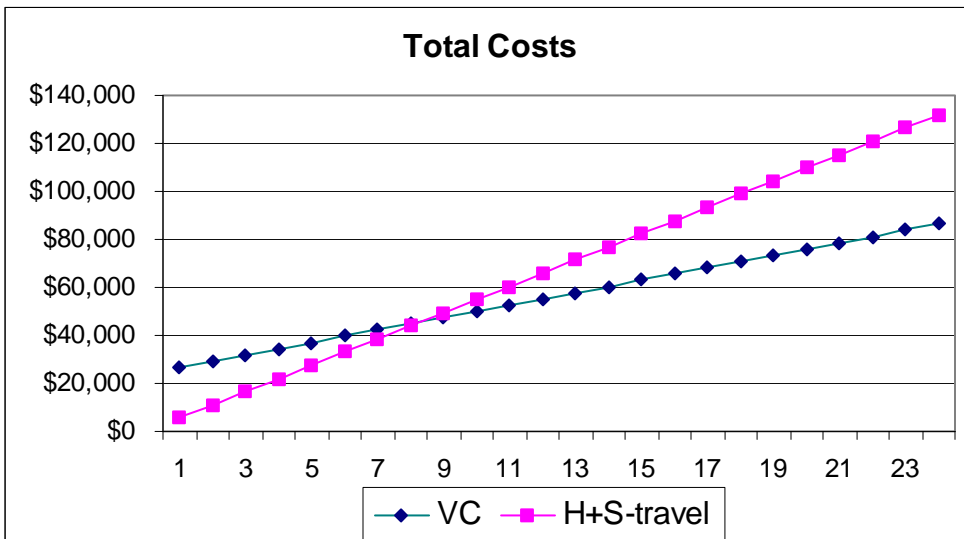


Figure 16 Breakeven analysis for small enterprise, heavier usage, example 6

Example 7: Zero Hard Costs of Travel

We've included this last set of numbers both for entertainment and to demonstrate that a reasonable payback can be realized by considering only the soft costs of travel. In this example, we've decreased the hard costs of travel to zero. Although we are not sure how a company could actually achieve this feat, we are willing to accept this assumption for illustration purposes only. In addition, we have applied an even lower figure of \$15,000 for the initial investment. Although this limited investment figure will force certain sacrifices, we believe they will still be able to source two high quality 384 kbps ISDN/IP systems with carts and monitor, plus the installation costs within this budget.

The associated table of assumptions follows.

General		Video	
# of Travelers	1	# of Video Systems	2
Average Cost / Trip (US \$)	\$0	Initial Cost	\$15,000
# of Meetings / Month	8	Annual Maintenance %	10%
Meeting Length (hrs)	2	Management Cost / Mon (US\$)	\$1,500
Round Trip Travel Time (hrs)	6	BRI – Fixed Fee / Month (US\$)	\$150
Non Productive Meeting (hrs)	0.5	ISDN – Usage Fee / Hour (US\$)	\$50
Pre and Post Travel Time (hrs)	1	Bridging Fee / Hour (US\$)	\$0 (N/A)
Average Annual Salary	\$80,000	% of Meetings Converted to VC	100%
Overhead % (Benefits, etc.)	33%		

Figure 17 Cost model assuming zero travel costs

As shown below, and based on the above assumptions, if the system is used to substitute for travel for only eight meetings per month, there is a breakeven of 24 months based on the soft costs of travel alone.

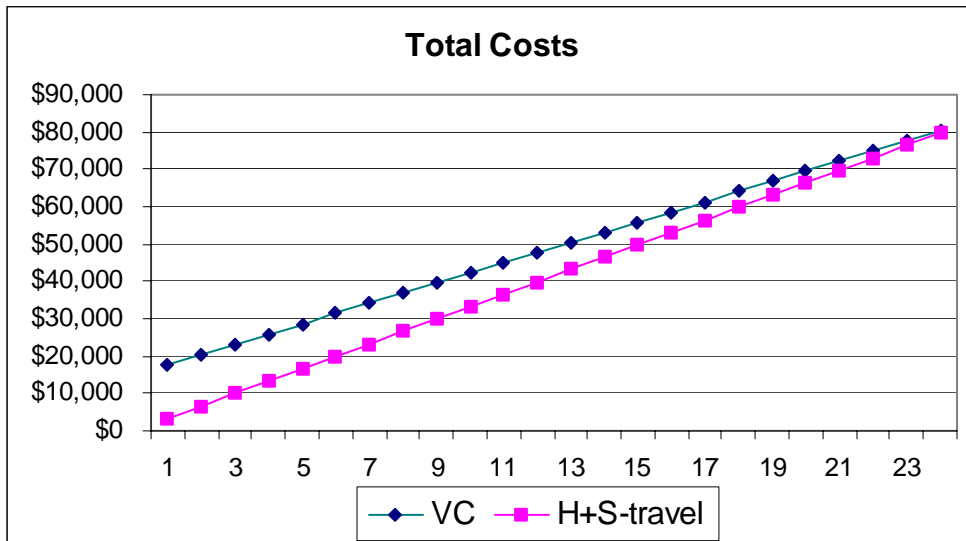


Figure 18 Breakeven analysis with ZERO travel costs, soft costs only

Section 4: Videoconferencing as a Recruiting Tool

Key Benefits

The use of videoconferencing as a recruiting tool is extremely common in large, medium, and small corporations. Making this application even easier to implement are the thousands of public rooms available for rental throughout the world. For only a few hundred dollars per hour, companies can use these fully equipped videoconferencing suites to enhance their internal recruiting function. To locate available video rooms, companies can turn to specialized “room brokers” such as Affinity and Regus. Hence, it is quite feasible for an employer to run a “virtual” recruiting function that is both convenient and cost effective for all parties involved. This is particularly efficient for initial screening interviews. By converting these first-interviews into “virtual” interviews, companies can limit travel investments to those candidates worthy of serious consideration.

Videoconferencing as a recruiting tool offers the following advantages.

➤ **Reduced Time-To-Hire**

By conducting a larger number of “virtual” interviews, companies can reduce their time to hire. This, in turn, helps them avoid lost opportunities and expensive project delays caused by vacant positions. A streamlined interview and hiring process can help companies shorten time to market, increase revenues per employee, and maximize their profits.

➤ **More Effective Interviews**

Videoconferencing can help companies improve the effectiveness of their interviewing process by allowing them to interview more candidates in a shorter period of time. In fact, in video-enabled HR departments, it is not uncommon for hiring managers to interview 10 or 15 different candidates for a single position in a single day.

➤ **The High-Tech Profile**

The use of videoconferencing can make a strong impression on the job prospect. By using such a cost-effective and efficient technology, your organization demonstrates a cost-conscious approach to conducting business and that you are focused on maximizing the convenience for the candidate.

➤ **Easy Archiving**

Videoconferencing lends itself easily to recorded interviews, enabling other managers to screen the candidate at their own convenience.

➤ **Decreased Logistics and Coordination**

The use of videoconferencing provides an element of flexibility regarding the scheduling of interviews and internal HR meetings because not all required staff must be physically present in the same location. For example, a candidate can be directed to a public room in a certain city and can meet with four different corporate managers, all located in different cities, within a two-hour period of time. Without videoconferencing, such meetings would have required the candidate to visit the company several times or would have forced a delay in the interviewing process until all key staff happened to be available and in the same office.

➤ **Decreased Dependence on Airlines and Flight Schedules**

Videoconferencing allows the HR department to schedule in-person interviews at times that are convenient for their personnel and the candidate instead of having to mold their schedules around airline schedules and delays.

➤ Increased Geographical Scope

The use of videoconferencing may expand the potential labor pool of candidates under consideration. This is particularly effective if you are considering a candidate from another country or continent.

➤ Saved Time and T&E Expenses

Videoconferencing enables the interviewer to avoid many of the costly and time-consuming niceties including group dinners and lunches and the normal chitchat that typically accompanies in-person meetings.

Payback Calculations – Recruiting

Using videoconferencing as a substitute for recruiting related travel can save both time and money. In this section, we have based our calculations on the following three sets of assumptions.

- a) The cost to physically transport a candidate to the company for an interview will average \$1,450 - per interview. This includes airfare, one night of hotel, per diem costs for food, taxis, airport parking, and all other hard travel costs. Given that interviews are rarely scheduled 21 days in advance and don't normally include a Saturday night stay, we expect that airfare for a recruiting trip will often be higher than the airfare for a typical business trip.
- b) We assume that the candidate will use a public conference room, with all charges to be billed to the company. These public rooms typically rent for approximately \$250 per hour and there is often a \$50 scheduling fee for the use of a "room broker." This means that the room rental cost for a one-hour interview will be \$300. It should be noted that these assumptions are somewhat conservative and may be higher than actual "street" prices for room rentals. For convenience and to minimize costs, the company will use its video system to dial into the public room for the interview. This means that the 384 kbps ISDN charges will be at the company's negotiated rate.
- c) We assume that the company will invest in a videoconferencing system that is capable of making or receiving 384 kbps ISDN calls. We also assume that the both the videoconferencing system and the ISDN network will be used only for interviews and that the associated costs will not be shared over other applications or departments. Based on these assumptions, the calculated cost for this dedicated videoconferencing system will be:
 - a. \$6,000 equipment purchase cost
 - b. \$600 network installation cost
 - c. \$200 technician set up costs
 - d. \$120 / month for the ISDN connections
 - e. \$400 / month for technician support
 - f. \$55 / hour for ISDN usage fees (long distance, etc.)

Hence, while the costs for person-to-person (P2P) interviews is directly proportional to the number of interviews conducted, the costs for the ISDN videoconferencing system include some fixed costs per month as well as a variable cost for using the equipment.

Recruiting Example 1:

Given the above set of assumptions, and assuming the company conducts only one interview of one-hour duration each month, the cost situation is as follows.

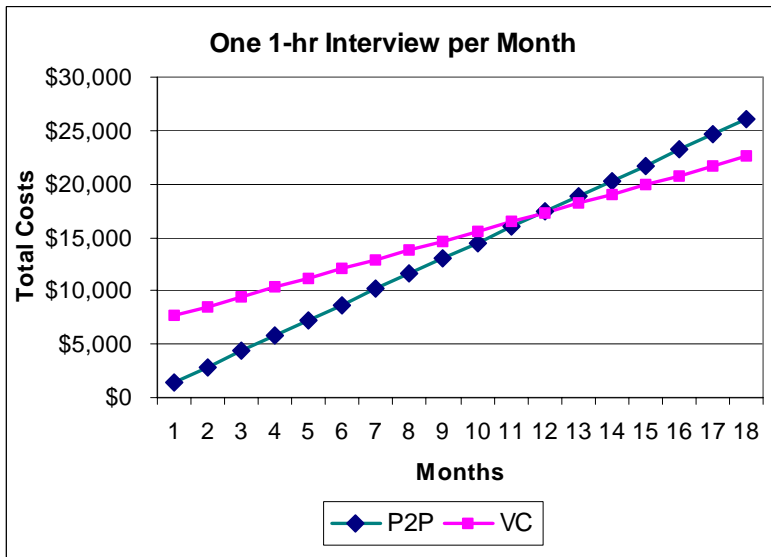


Figure 19 Breakeven analysis assuming one interview per month

As shown, the payback on the videoconferencing system investment occurs in twelve months.

Recruiting Example 2: Two Interviews per Month

By assuming that the company uses the videoconferencing system to interview two candidates per month instead of one (still assuming a single one-hour interview per candidate), the situation changes dramatically and the resulting payback now occurs in month 5 as shown in the curve below.

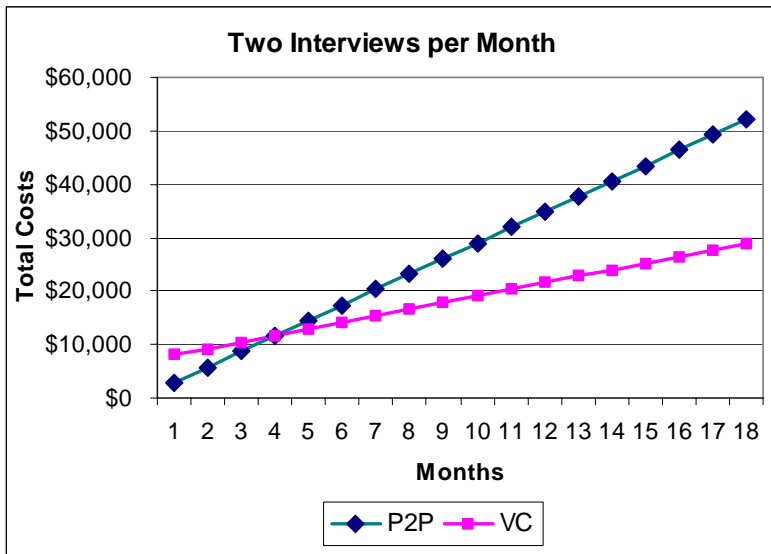


Figure 20 Breakeven analysis assuming two interviews per month

Example 3: Decreased Cost of Travel

By changing the assumed hard cost of travel to from \$1450 to \$900 per trip, the payback situation for two interview candidates per month lengthens significantly to 12 months.

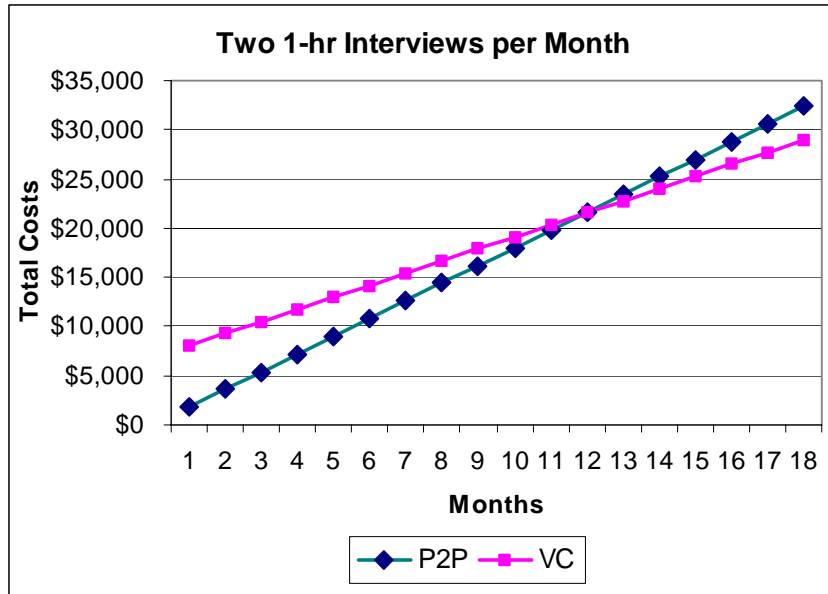


Figure 21 Breakeven analysis with reduced travel costs, two interviews/month

Example 4: Two 3-hour Interviews per Month

In this example we assume that travel expenses average \$1450 / candidate and that we will interview two candidates per month. However, in this scenario the interviews for each candidate will run for three hours instead of one. This results in higher ISDN usage fees and room rental costs, but would not necessarily increase the cost of business travel. Again, we are NOT including the savings that results in management time from not having to entertain the candidates or other such factors.

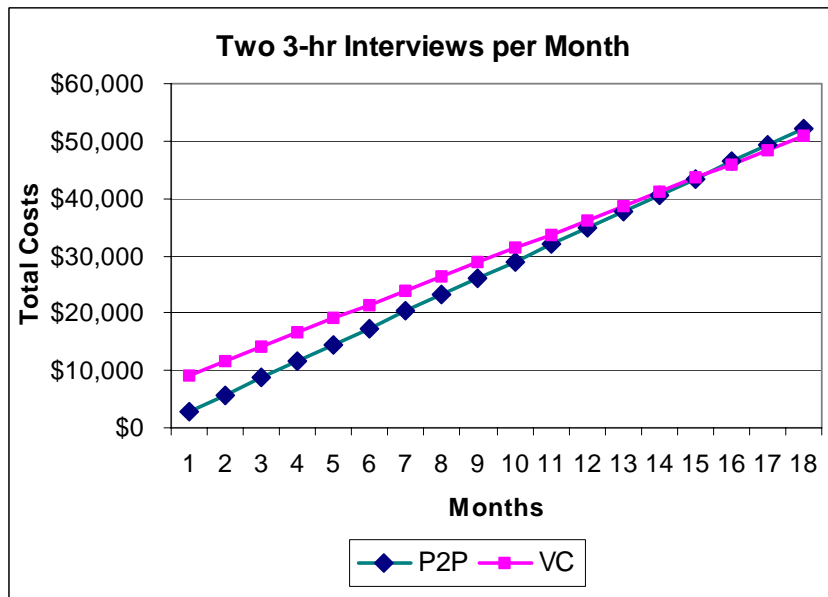


Figure 22 Breakeven analysis with two three hour interviews/month

The breakeven in this example takes place in month 16.

Section 5: Project Management

The use of videoconferencing and visual collaboration can yield significant improvements in corporate efficiency – especially in the project management arena. While it is common to categorize these benefits as relating to travel avoidance, one should also consider the decreases in time-to-market resulting from the use of these business tools. Companies and teams that understand the strong relationship between time-to-market and profitability will typically achieve superior financial results. By cutting time-to-market, engineering and marketing teams can introduce more products to the market in a given period of time. By introducing products to the market quickly, companies can avoid or at least delay competitive pressure that may force lower prices and decreased margins. The first few months of a product's life can be the major determinants of a product's overall profitability. This is particularly true for high-tech products and services.

To illustrate the high potential leverage that can be achieved by cutting time-to-market, we take a simple example. We assume that a product development team split over two sites has just initiated a 24-month development cycle. To expedite product development and foster collaboration, senior management decides to invest in two videoconferencing systems and an IP network connecting the two that allows unlimited use.

Video	
# of Videoconferencing Systems	2
Initial Investment	\$24,000
Annual Maintenance %	10%
Management Cost / Month	\$1,000
IP connection per site	\$1225

Figure 23 Cost model for project management analysis

To simplify our calculations, we assume that the video systems will not be used for any other purpose and that at the end of the 24-month product development cycle, the equipment's salvage value is zero.

The costs associated with the videoconferencing equipment and network may be insignificant in relation to some other factors.

We assume that the development team spread across the two sites costs the company \$35,000 per month in salary and overhead. We also assume for these calculations that the product they are working on will generate \$500,000 per month in sales and that the product will generate 18% profit before taxes, or \$90,000 per month.

Hence, saving one month in the development cycle will save \$35,000 in before tax salary costs plus generate \$90,000 in before tax earnings.

The table calculates the total cost to the company for the development team salaries, videoconferencing network and equipment, and then compares these figures with 0, 1, 2, and 3 months cut off the development cycle.

Month	Salaries	VC	Sal + VC	1-mo	2-mo	3-mo
20	\$700,000	\$98,000	\$798,000	\$798,000	\$798,000	\$798,000
21	\$735,000	\$101,700	\$836,700	\$836,700	\$836,700	\$836,700
22	\$770,000	\$105,400	\$875,400	\$875,400	\$875,400	\$746,700
23	\$805,000	\$109,100	\$914,100	\$914,100	\$785,400	\$656,700
24	\$840,000	\$112,800	\$952,800	\$824,100	\$695,400	\$566,700

Figure 24 Total project development costs

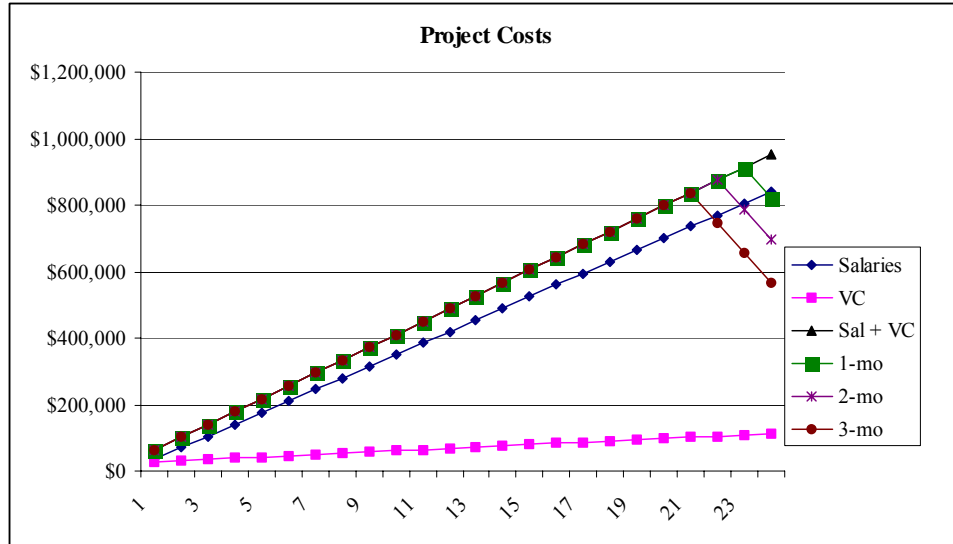


Figure 25 Total project development costs with time savings

The lines in the chart show the total costs over a 24-month period for:

1. Salaries only – according to our assumed costs for the development team
2. The videoconferencing system (hardware, maintenance and management, and network costs)
3. The total of salaries and videoconferencing costs.
4. The total of salaries and videoconferencing costs with a one month savings in the 24-month cycle. The total cost is calculated to be \$824K, a savings of approximately \$16K over the “no-video” scenario.
5. The total of salaries and videoconferencing costs with a two month savings in the 24-month cycle. The total savings is now approximately \$150K.
6. The total of salaries and videoconferencing costs with a three month savings in the 24-month cycle. The total savings is now approximately \$275K.

Section 6: Videoconferencing as a Telephone Upgrade

Learning and Persuasiveness Benefits

Although telephone meetings can be quite effective, the fact that such meetings do not offer any visual impact for the participants is a significant drawback. By converting such a meeting into a face-to-face meeting, such as a videoconference, many benefits can be realized.

Increased Learning – According to the University of Wisconsin, attendees in a face-to-face meeting learn 200% more than counterparts attending an audio-only session. Such surveys are the reason that videoconferencing has been deployed and heavily used in distance learning environments.

Improved Rate of Absorption – A Wharton School of business study indicates that students (or attendees) in a face-to-face session (or presentation) can absorb information up to 40% more quickly than during a non-visual session. When applied to a videoconference meeting, this means that 40% more information can be presented during a video meeting compared to during an audio-only session. Alternatively, the same information can be presented in 40% less time during a video session.

Augmented Content Retention – A joint study by Harvard and Columbia revealed that participants in face-to-face sessions retain 38% more information than counterparts in non-visual meetings. In other words, your clients, colleagues, or subordinates will remember 38% more of the content from a face-to-face meeting than from a non-visual venue.

Enhanced Persuasiveness – According to a recent University of Minnesota study, presenters in a face-to-face venue will enjoy a 43% increase in their powers of persuasion. In other words, the same presenter speaking on the same topic to the same audience will have a 43% improvement in persuasiveness thanks to the visual component of videoconferencing. Clearly, this justifies the use of videoconferencing for any remote sales efforts.

Other Visual-Venue Benefits

In addition to the above benefits, converting a telephone (audio only) meeting into a videoconference yields the following benefits:

Enhanced Focus – The previously referenced WorldCom survey reveals that many business meetings are not effective because of the lack of focus and attentiveness of the attendees. In fact, a full 91% of executives admit to daydreaming during such meetings. In addition, 39% have fallen asleep and 70% bring or conduct other work during meetings. Videoconferencing's face-to-face component makes it virtually impossible for employees to divert their attention away from the matter at hand. This is another soft benefit of videoconferencing.

Expedited Trust Building – People feel more comfortable working with people that they know, trust, and have met in person. Unfortunately, in today's competitive business environment, the expense of sending staff to remote locations simply to meet their counterparts is difficult to justify. However, the face-to-face component of videoconferencing allows people to meet "face-to-face" without having to travel. By helping people develop a rapport, videoconferencing helps work teams improve their working relationships, efficiency, and performance.

Section 7: IP Networks and Rich Media Communications

Videoconferencing and the ISDN Legacy

Because videoconferencing involves the real-time transmission of voice and video signals, it was originally designed to run on circuit-switched networks. In recent years, nearly all videoconferencing deployments utilized the worldwide Integrated Services Digital Network (ISDN), a public circuit-switched network. Although not as widespread as standard telephone lines, ISDN is available throughout Europe, Asia Pacific and North America. Historically, ISDN has had a series of compatibility and interoperability issues. However, the majority of these issues have been resolved in the last few years. Due to its relatively low cost and global availability, ISDN service has been responsible for the widespread adoption of group videoconferencing systems. However, ISDN does have many disadvantages, including the following:

Slow and Problematic Deployment

The deployment of ISDN lines has always been difficult, time consuming, and problematic. Although things have improved in recent years, the fact is that most companies, including many local telephone service providers, do not deploy ISDN lines on a daily basis. Therefore, installations of ISDN are plagued with problems and issues are often resolved through time-consuming trial and error. Lead times of several months are not uncommon for ISDN deployments.

ISDN Is A Metered Service

In order to understand the usage costs related to ISDN based business quality videoconferencing, one must understand that a typical videoconferencing call actually involves multiple ISDN connections. In fact, a single ISDN videoconferencing call at 384 kbps (a somewhat standard rate for business quality conferencing) requires the use of six data (or B) channels simultaneously, each of which are charged on a per-minute basis. Unfortunately, this means that ISDN videoconferencing users incur usage fees for six concurrent phone calls, which makes ISDN videoconferencing relatively expensive. It should be noted that some videoconferencing takes place at lower data rates, such as 128 kbps. In this situation, fewer data lines are used and therefore the total per minute charges are proportionately lower.

Questionable Reliability(especially internationally)

As described above, business quality ISDN videoconferencing requires the use of several ISDN connections. For example, to establish a 384 kbps ISDN video call, six ISDN B channels must be bonded together to act as one 'pipe' for the audio/video call. Should any of these multiple connections experience a problem or failure, the meeting can be impacted or may even fail. Although some video systems do have the capability to recover from minor network glitches, these type of issues are still quite common in ISDN based videoconferencing.

A Separate Network

The majority of enterprise networks are not ISDN based. Therefore, in order to use ISDN based videoconferencing, organizations had to deploy and therefore manage a totally separate ISDN data network designed to support this specific application. Therefore, a typical organization now had three networks to manage; their packet-switched computer network, their circuit switched analog telephone network, and their circuit switched ISDN videoconferencing network.

Must Be Locally Managed

Legacy videoconferencing systems were not designed to support remote management. Instead, in order to manage such a system, support staff had to be present in the same room as the installed system. In organizations with limited system deployments, this did not cause a significant problem. However, this made the management of a large number of video systems both expensive and staff intensive.

The Benefits of IP Based Videoconferencing

The majority of videoconferencing systems available today support operation on both ISDN (H.320 protocol) and IP (H.323 protocol) networks. The benefits of IP-based videoconferencing include:

Financial Advantages

Decreased Buy-In Price

IP-only videoconferencing systems are typically less expensive than ISDN based systems because the systems do not need ISDN-interface circuitry and software. In some cases, users may elect to use their PCs as the basic processing engine for IP conferencing. In this situation, the incremental cost is typically only the cost of a simple camera.

Decreased Usage Fees

Users of IP networks do not typically incur per-minute usage fees. In fact, if a company's existing corporate IP data network has the necessary bandwidth and quality of service necessary to support video traffic, video calls originating and terminating on that network will be absolutely free.

In addition, many IP network providers offer flat rate plans for network services – similar to the model pioneered by AOL for Internet access and now used by many of the cell phone service providers. With these plans, the network usage is often viewed as a fixed cost (perhaps \$400 / month), which allows either a certain number of usage hours or, in some cases, an unlimited amount of network usage.

User Experience Advantages

Enhanced Audio and Video Quality

The quality of a videoconference meeting depends heavily upon the bandwidth (data rate) of the connection. As described previously, ISDN based video calls utilize a combination of data channels (called B channels), each offering 64 kbps of bandwidth. A standard business quality video call requires the use of 6 ISDN B channels, to provide the necessary 384 kbps bandwidth. On the other hand, IP networks typically offer at least 10 Mbps (or almost 27 times more) bandwidth to each video system. Therefore, a standard IP video call might be placed at speeds of 512 kbps or even higher, resulting in an enhanced level of audio and video quality.

Increased Reliability

Using the IP network allows users to avoid the somewhat fragile bonding of multiple ISDN data channels necessary for an ISDN video call. This results in a significant improvement in reliability.

Improved Convenience

For many years, the high cost of purchasing and installing ISDN based video systems limited deployments to large conference rooms and other shared meeting spaces. This meant that users had to compete with the rest of the user community for access to these facilities.

Fortunately, IP based systems are less expensive to purchase and IP network lines are easier and cheaper to deploy. This has paved the way for video system installations in offices and even homes. Since these spaces are not typically shared with others, these users now have virtually unlimited access to these video systems – without having to reserve any shared facilities.

Efficiency Benefits

Network Convergence

One of the primary advantages of deploying IP based videoconferencing is the ability to use the organization's primary data network as the means of transport. This results in both cost savings and efficiency enhancements. A converged network implementation can raise quality of service (QoS) concerns however both by the conferencing user who is concerned about the quality of his voice and video signals and by the data communications or network professional who is concerned about maintaining the integrity of the mission-critical data network and applications.

Dynamic Bandwidth Allocation

As described previously, ISDN based videoconferencing requires the use of dedicated data lines. Once connected to the videoconferencing systems, these lines cannot be shared between more than one system or by other applications / users within the organization.

On the other hand, the packet-switched nature of IP networks allows many systems, both computer systems and video systems, to share a pool of dynamically allocated bandwidth. In fact, until a video call is actually placed, the video system will not need any of the available bandwidth. Furthermore, if during the video call the bandwidth required should momentarily decrease, perhaps due to a decrease in video motion, other systems and application will be able to use that bandwidth as required.

Management Benefits

Centralized Management Has Arrived

IP based video-systems are always connected to the packet-switched network, which allows these systems to be remotely controlled and managed. In addition, in recent years, video system vendors have released centralized management tools that allow a relatively small number of support staff to effectively manage a large number of locally and remotely deployed video systems. This means that support staff no longer have to be physically present in the videoconferencing rooms to perform basic system maintenance tasks.

Improved Call Permissioning

Large-scale conferencing environments often use an IP-based software product, called a gatekeeper, to control and track the usage of their videoconferencing systems. By properly configuring these gatekeepers, organizations can determine which calls to permit, at which speeds, from which users / systems, to which users / systems, and across which networks. For example, a company may decide that calls from public conference rooms should never exceed a speed of 512 kbps. This helps conferencing managers properly administer their video networks.

Availability of Usage Information / Automated Billing

As described above, gatekeepers track all videoconferencing usage within an organization. This information can be downloaded by conferencing managers and used to generate detailed usage information and key performance indicators. Not only can this information be used to calculate the savings realized by using video, but savvy managers can manipulate this information into a form useful for internal billing and cost allocation.

Scalability / Reach Benefits

Improved Scalability Within The Enterprise

As described previously, IP based video systems, and specifically PC-based camera only solutions, are less expensive than ISDN systems. This low price point has paved the way for video system installations in offices and other spaces within the enterprise.

Improved Reach To Homes / Telecommuter Support

Unfortunately, the installation cost, complexity, and high usage fees associated with ISDN prevented videoconferencing from penetrating the home and small office (SOHO) markets. However, the universal availability of IP data lines for Internet access and the low cost of IP-only video systems have made videoconferencing economically viable for SOHO applications. As the penetration of broadband increases in homes - driven by DSL and cable modem service providers - the use of videoconferencing by telecommuters, home office workers, and even consumers will increase. We expect to see some DSL and cable providers address the QoS concerns for SOHO users as well.

The following table summarizes some of the problems or issues solved by the use of IP based video systems.

Area of Comparison	ISDN Legacy Solutions	IP Solutions
Investment Cost	High system cost	Lower system cost – especially for camera only PC solutions
Data Network	Separate network required	Can use existing packet-switched IP data network
Data Line Deployments	ISDN lines were (and are) problematic to deploy	IP data lines (LAN drops) are easy to deploy
Usage Fees	Expensive per minute usage fees.	Inexpensive, or even no usage fees, depending upon deployed data lines
Reliability	Low due to the need to use of several data lines at the same time (ISDN bonding)	High due to the reliability of IP networks and the skill of network support staff.
Audio and Video Quality	Limited by relatively low available bandwidth	Tends to be higher thanks to additional bandwidth
Remote Management	Limited	Standard
Call Permissioning	Not Available	Available through the use of gatekeepers and remote management systems.
Availability of Statistics / Usage Information	Limited	Available through the use of gatekeepers and remote management systems.
Scalability Within The Enterprise	Limited by system cost and availability of ISDN lines	Easy to scale thanks to low cost and availability of IP bandwidth lines.
Scalability To The Home (SOHO / Telecommuter)	Limited by system cost and availability of ISDN lines	Well suited for SOHO and Telecommuter applications.

Figure 26 Summary comparison of IP and ISDN for Videoconferencing

Cost of Ownership Issues with IP

There are numerous issues that complicate the task of writing a generic article about the cost of videoconferencing over IP networks. While ISDN networks are typically dedicated for videoconferencing applications within the enterprise, this may or may not be the case for IP. In fact, organizations considering the deployment of IP-based videoconferencing must evaluate the following:

- Is the current IP network suitable for IP-based videoconferencing, or must it be upgraded? If upgrades are necessary, how significant are the associated costs? Will additional routers or router upgrades be required?
- Should the enterprise run voice, video, and data on the same network? If not, should a separate IP network (known as an overlay network) be installed specifically for video communications?
- Are the necessary IP data lines available from service providers (or telephone companies) in the locations of interest? If not, are there other alternatives that should be considered and what costs will that generate? Also, in what increments must bandwidth be acquired in each location?
- What billing options / service offerings are available from the IP network service provider? Possible offerings include per-minute plans, fixed step interval programs, or pay-one-price (no limit) usage arrangements.
- Will a video multi-point bridge (or MCU) be necessary? If so, should the MCU be purchased and managed internally or should all bridging functions be outsourced to a service provider. If an internal MCU is necessary, what is the magnitude of the investment required? In addition, will the existing internal staff be able to manage the video bridge?
- Will all of the systems be connected to the internal IP network? If not, how many ISDN gateways will be required in which locations? In addition, should these gateways be managed by internal staff or by an outside vendor?
- What additional efforts or costs will be incurred to guarantee the necessary quality of service (or QoS)? In other words, will router hardware or software upgrades and investments in traffic shaping / QoS management systems be necessary?
- Are there security concerns to consider? If so, must the corporate firewalls or NAT systems be modified, re-configured, or upgraded to allow IP-based videoconferencing traffic?
- Are the existing network maintenance and support resources both willing and able to support a converged network carrying data, video, and voice traffic? If not, how many additional resources and what additional training will be required?
- Is the current network maintenance and support staff sufficient if the network is expanded to run voice and video as well as data. How much time will be spent at the beginning of the IP video project to install, test, and debug the conferencing systems?

Types of IP Network Service Providers

While we consider the state of the IP-video network service provider (NSP) market to be relatively immature (compared to ISDN providers or to IP data network providers), there appear to be several different technical approaches or philosophies behind the current crop of network offerings.

- The facilities based NSPs or carriers (for example Qwest, Level3, Global Crossing, ATT, WorldCom, Sprint) own their own networks and claim that by owning the network they can ultimately provide the lowest cost and control the quality of service on their network.
- The private-line-leasing NSP (for example Wire One, SAVVIS, Masergy, PSInet) leases but does not own his private lines. The claim is that the Public Internet is not suitable for business-quality videoconferencing and that customers need to build their own network or use the network of the NSP. Many of these vendors use ATM rather than pure IP and one uses IP/MPLS.
- The public Internet NSP (for example, Virtela, Internap) believes the public Internet is suitable, and provides customers with encryption and other security services. The strategy is based on a belief that the Internet has sufficient capacity to provide QoS and that there is no need to build a private network.
- The VPN NSP (for example, Virtela, Internap) uses a strategy of creating a private network running over the public Internet. Tunneling provides security.

Each of these strategies is available in the market, and time will tell which one offers the price/performance mix that best meets customer needs.

In addition, some NSPs are business extensions of videoconferencing equipment VARS (Wire One) and others are extensions of conferencing service providers, bridging and gateway services (V-SPAN). In the end, we believe customers will want network services combined with bridging and gateway services.

Section 8: Payback Calculations – ISDN vs. IP

As previously described, there are a number of factors that determine the actual cost of deploying and managing an IP-based videoconferencing network. In an effort to simplify the comparison, we will compare only the operating costs of an IP network used for videoconferencing to the operating costs of an ISDN network. The reader should consider that these cost comparisons include ONLY A PART of the overall cost equation. For example, this analysis does include monthly recurring charges (ISDN fixed charges and IP local loop fees), but does not include network installation charges or any costs that might be incurred if the customer has to upgrade his routers and switches.

The Cost of ISDN Videoconferencing

Throughout this section, we will be comparing the cost of different flavors of IP based videoconferencing to the cost of standard ISDN videoconferencing. Our estimate of the cost of standard ISDN videoconferencing is shown in the chart below for 10 to 50 hours of monthly usage at 128, 384, 512 and 768 kbps ISDN connection speeds, assuming \$0.10 per minute per B channel.

Monthly Cost of ISDN Videoconferencing –Table A				
Fixed Charge /Channel /Month		\$ 22.00		
Average Cost /Channel/ Minute		\$ 0.10		
Connection Speed	128 kbps	384 kbps	512 kbps	768 kbps
	2 x B-Chan.	6 x B-Chan.	8 x B-Chan.	12 x B-Chan.
10 hours	\$ 164.00	\$ 492.00	\$ 656.00	\$ 984.00
20 hours	\$ 284.00	\$ 852.00	\$ 1,136.00	\$ 1,704.00
30 hours	\$ 404.00	\$ 1,212.00	\$ 1,616.00	\$ 2,424.00
40 hours	\$ 524.00	\$ 1,572.00	\$ 2,096.00	\$ 3,144.00
50 hours	\$ 644.00	\$ 1,932.00	\$ 2,576.00	\$ 3,864.00

Figure 27 Monthly cost model for ISDN videoconferencing at \$0.10/B/minute

Based on the information above, a 384 kbps ISDN connection has a fixed rate per month of \$132 (6 channels at \$22/channel / month) plus a usage charge of \$0.60 (6 channels at \$0.10 usage fee per channel per minute) per minute. It should be noted that the above usage fees do not necessarily reflect potential additional long distance charges and that the numbers in these tables are AVERAGE per minute charges.

The table below shows the cost of ISDN videoconferencing with an assumed per minute usage fee of \$0.15, another common figure used in the industry.

Monthly Cost of ISDN Videoconferencing – Table B				
Flat per channel/Month		\$ 22.00		
Price/min/channel:		\$ 0.15		
Speed	128	384	512	768
	2 x B-Chan.	6 x B-Chan.	8 x B-Chan.	12 x B-Chan.
10 hours	\$ 224.00	\$ 672.00	\$ 896.00	\$ 1,344.00
20 hours	\$ 404.00	\$ 1,212.00	\$ 1,616.00	\$ 2,424.00
30 hours	\$ 584.00	\$ 1,752.00	\$ 2,336.00	\$ 3,504.00
40 hours	\$ 764.00	\$ 2,292.00	\$ 3,056.00	\$ 4,584.00
50 hours	\$ 944.00	\$ 2,832.00	\$ 3,776.00	\$ 5,664.00

Figure 28 Monthly cost model for ISDN videoconferencing at \$0.15/B/minute

Dynamic Bandwidth Usage

Some of the pricing models referenced in this section are based on the number of bits transferred on the providers IP network. In this situation, it is important to understand that during an IP videoconference, the number of bits transferred across the service provider's network is less than the connection rate. In other words, during a 384 kbps IP videoconference, the number of bits transferred may actually average 280 kbps (or less) per second. The number of bits actually transferred per second is dependent upon the motion content in the actual video (i.e. changes in the video image). Masergy, one of the service providers described in this section, reports that the bits transferred during a typical IP videoconference is actually 30–40 % lower than the connection rate. This factor is valid only for those service provider plans that charge based on the number of bits transferred across the network.

Fixed vs. Variable Costs

From the above tables and from the preceding discussions, it is clear that the fixed costs per month for ISDN are generally much less than those for an IP network. A triple BRI ISDN connection from the local phone companies, for example, typically costs \$130-\$160 per month to have and 60 to 90 cents per minute to use. IP, on the other hand, usually has a much higher fixed cost (\$500 - \$1500 per month) and a much lower usage charge. In some cases, the usage charge is zero. This tradeoff is what generates the breakeven curves below.

IP Videoconferencing With Masergy Communications

MASERGY (www.masergy.com) is a privately held global provider of customer-controlled network services for enhanced application performance. The company was created to offer enterprises a way to manage the performance of their business applications and networks, while avoiding the costs and headaches of building and maintaining the infrastructure. Masergy's infrastructure is unique in its ability to deliver differentiated, end-to-end prioritization of traffic based on classification controlled directly by the customer. For instance, real-time applications, such as videoconferencing, are assigned to the highest priority class of service. Accordingly, MASERGY's IP video connectivity solution, inControl Video, guarantees that videoconferencing traffic is delivered with unmatched Quality of Service (QoS) at all times, under all network conditions.

Key performance metrics of the MASERGY network for video traffic include:

- 100 percent packet delivery.
- 100 percent in-sequence packet delivery
- Maximum latency variation (jitter) of 10ms.
- Sub-1 second fast fail-over (network recovery)

These industry-leading performance metrics are possible because of the Class of Service (CoS)/ Quality of Service (QoS) capabilities inherent in MASERGY's native Multi Protocol Label Switching (MPLS) IP backbone. Customers do not need special equipment to take advantage of this capability. A standard IP router is the only necessary customer premise equipment (CPE).

MASERGY's inControl Video solution is priced to be a cost effective, one-for-one replacement for legacy ISDN connectivity in a video-only (overlay) network implementation. The basic connectivity platform, however, can provide equally powerful benefits to voice communications and the transport of mission-critical business software applications over a wide area network. The MASERGY solution's true value lies in its ability to fix today's problem -- guaranteed IP QoS for videoconferencing -- while at the same time pre-provisioning a flexible migration path that permits the convergence of other communication services (voice, data, Internet) onto a streamlined, multi-service network platform. MASERGY customers should realize an immediate return on their investment for a video-only solution that can be expanded as other services are added to the same network service.

Masergy's offering comes in several different flavors depending upon whether the customer is willing to sign a multi-year contract and whether the customer prefers to pay based on usage (i.e. bits of data transferred) or pay a fixed monthly fee. Masergy also offers two different service plans depending upon whether the customers need their network for video communications only or for video and Internet access.

In order to use the Masergy service (or any external IP service), the customer must have a data line (i.e. the local loop) installed. Typically, Masergy will order and provision this on the customer's behalf. The cost of this local loop is estimated at \$300 / month. Furthermore, Masergy charges their customers a fixed rate of \$300/month for the line connecting the customer's site to the Masergy system. Hence the customer pays \$600/month to have the IP connection to the Masergy backbone. We should note that this fixed cost is much higher than the fixed network cost for a 384 ISDN line.

Example 1:

Service Provider: Masergy

Contract: one year term; no discounts assumed

Pricing Plan: Usage based (not fixed)

ISDN Rate: Table A (\$0.10 usage fee / channel / minute)

In this first example, we assume that the customer is using Masergy's service on a one year term (i.e. no long term contract discounts) and we assume a variable rate plan on a video-only network. The following table illustrates the costs involved in using the Masergy system under this service plan.

MASERGY Dedicated IP Video				
T1 Port		\$300		
Local Loop (estimate)		\$300		
Cost/Gigabit/:		\$4.00		
H.323 efficiency factor	0%	30%	35%	40%
Speed	128	384	512	768
Gbits/Hr	1.8432	3.87072	4.79232	6.63552
10 hours	\$673.73	\$754.83	\$791.69	\$865.42
20 hours	\$747.46	\$909.66	\$983.39	\$1,130.84
30 hours	\$821.18	\$1,064.49	\$1,175.08	\$1,396.26
40 hours	\$894.91	\$1,219.32	\$1,366.77	\$1,661.68
50 hours	\$968.64	\$1,374.14	\$1,558.46	\$1,927.10

Figure 29 Masergy IP pricing for dedicated IP video, no long term contract

The above table merits some discussion. Masergy charges its users based on the number of bits transferred - \$4 per gigabit. And like a cell phone, the customer pays whether he originated the call or not. And bits transferred includes bits sent and bits received. All of these factors are included in the above table in making the calculations for cost per hour of usage at different bit rates. In addition, during a video call on a packet network, there are many times when the actual bit rate is far less than the bit rate at which the call was made. If there is little motion, for example, the bit rate falls off dramatically. Masergy's experience based on internal testing has resulted in the efficiency factors in the above table. For example, the actual bit rate in a 384 kbps H.323 call averages about 30% less than 384 kbps. These efficiency factors are included in the price table as well. Hence, we calculate the cost for a 384 call at $\$4 \times 384 \times 60\% \times 2$ (send/receive) $\times 2$ (near end/far end) times the appropriate factor to convert kilobits/second to gigabits/hour.

Note: this analysis leads to some logical issues. Our cost table assumes one network connection to the Masergy network but assumes the cost for the bit transfers at both ends. In an ISDN world of course, only the call originator pays network fees, but both ends pay network access charges.

Based on the above table and by using the previously provided ISDN cost chart A (\$0.10 per minute per channel usage fee), we can calculate the savings that can be realized by converting to the Masergy IP offering from ISDN. The graph that follows shows the results of this calculation.

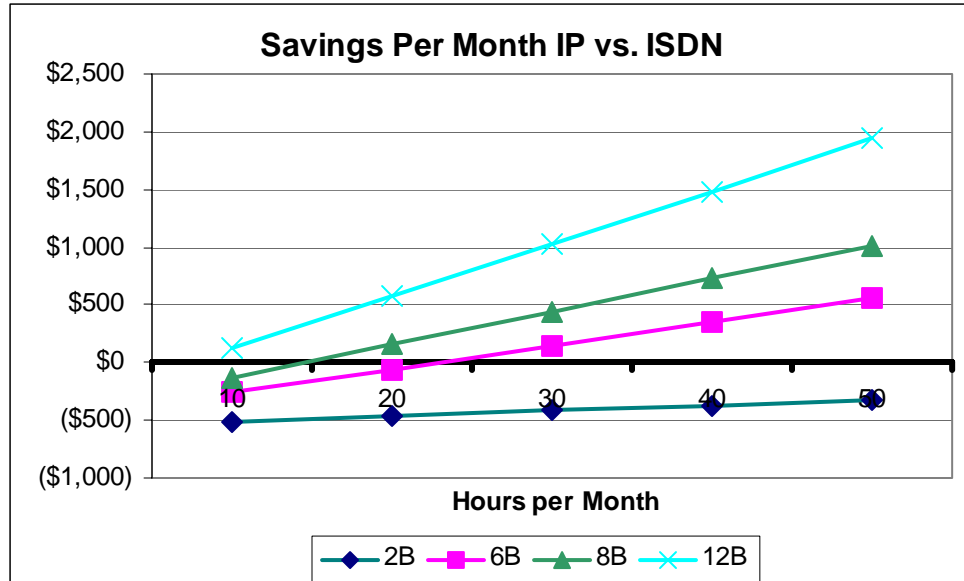


Figure 30 Savings per system: Masergy IP network vs. ISDN at \$0.10/B /minute

As shown in the graph above, for 128 kbps (2B channel) conferencing, it is actually more expensive to use the Masergy solution. However, for 384 kbps (6B channel) conferencing, the breakeven occurs at approximately 24 hours per month.

Example 2:

Service Provider: Masergy

Contract: None (one year term)

Pricing Plan: Usage based (not fixed)

ISDN Rate: Table B (\$0.15 usage fee / channel / minute)

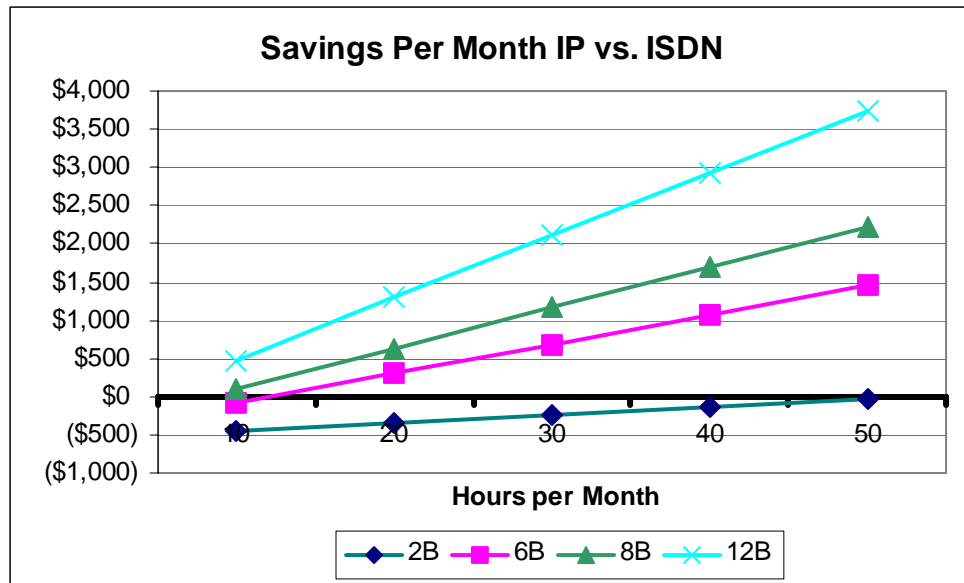


Figure 31 Savings using Masergy IP network compared to ISDN at \$0.15/B /minute

As shown in this chart, increasing the per-minute, per channel usage fees for ISDN to \$0.15 from \$0.10 has a significant impact on the break-even point for converting over to the Masergy solution.

Example 3:

Service Provider: Masergy
 Contract: None (one year term)
 Pricing Plan: Fixed Rate Plan

As previously mentioned, Masergy also offers a fixed rate program that companies using more than 30 hours of videoconferencing per month should consider. Masergy’s fixed rate program costs, without the local loop, are as follows:

Flat Rate	128 kbps	384 kbps	512 kbps	768 kbps	1.54 Mbps
IP Video Only					
Monthly Cost	\$700	\$850	\$1,075	\$1,300	\$1,800

Figure 32 Masergy’s fixed rate price schedule – without local loop

Note: the 128, 384, 512, and 768 ports are actually provisioned at 10% higher speeds to account for video overhead. The customer pays for 128, 384, 512, and 768 of usable video bandwidth.

As one would expect, the cost savings realized by using fixed rate IP videoconferencing become more significant as system usage increases. For example, let’s assume a scenario in which two locations are connected via videoconferencing at all times. This is a reasonable requirement for financial trading desks or globally deployed call centers. In this situation, the usage might be 10 hours/day for 22 days each month, which on a 6B ISDN call at 8 cents per B channel per minute would cost \$6336/month in ISDN charges. However, the cost using Masergy’s fixed rate plan would be only \$850. Clearly, this is an extreme example, but it does illustrate the dependency between usage minutes and potential savings.

The chart that follows shows the savings that can be realized at different connection speeds and hours of usage by converting from ISDN videoconferencing (i.e. a per minute fee model) to Masergy’s fixed rate plan.

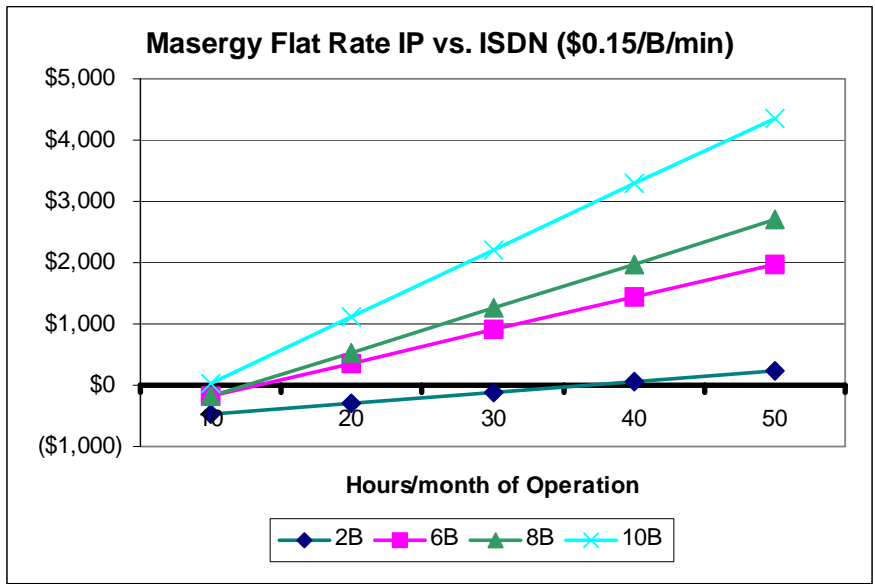


Figure 33 Savings per month: Masergy IP vs ISDN

As shown above, by using the fixed price model, companies using 2B (128 kbps) ISDN videoconferencing will realize a cost benefit only if they place more than 40 hours of video calls each month. However, if the company uses 6B (384 kbps) ISDN videoconferencing, the break even for converting over to the Masergy fixed rate plan occurs at only 14 hours of usage each month.

Video Plus Internet

We suspect that many customers, particularly the small, remote, or home office will want a high speed IP connection for video plus Internet access. Masergy offers such a package, based on the company’s MPLS technology. For customers opting for a usage based model, the cost is \$999/month plus the \$4.0 per gigabit charge, assuming no discount for signing a long term contract. The flat rate plan is as follows

Flat Rate IP Video Plus Internet	128 kbps	384 kbps	512 kbps	768 kbps
Monthly Cost	\$1400	\$1550	\$1,775	\$2,000

Figure 34 Masergy pricing for video plus Internet access

These costs do not include the local loop charges.

IP Videoconferencing With the Glowpoint Network from Wire One

Wire One also offers IP based videoconferencing network services. However, Wire One's offering, dubbed Glowpoint, is based on a tiered usage model - the price structure for customers is based on several tiers of "hours per month" and bandwidth. Wire One has extensive experience in the videoconferencing industry as a reseller/integrator and offers scheduling and multipoint services to its Glowpoint customers at an additional charge. Bridging charges are typically \$50 per port per hour.

Wire One Glowpoint Network – costs			
Hrs / Month	128 kbps	256 kbps	512 kbps
10	\$199.00	\$299.00	\$399.00
20	\$276.00	\$464.00	\$625.00
50	N/A	N/A	\$699.00

Figure 35 Wire One Glowpoint price structure

To minimize costs, Wire One typically assumes that its Glowpoint network can be delivered to the customer via SDSL. If SDSL is not available at the customer's required location, the Glowpoint network would most likely ride on top of a T1 or fractional T1, thereby raising the costs above those charted in this section.

The following table illustrates the basic cost comparison between ISDN videoconferencing and Glowpoint videoconferencing.

	384 ISDN	Glowpoint**
Installation	\$350	\$700
Fixed cost/mo - network	\$150	Included in figures below
per min charges	\$0.90	\$0
10 hrs/mo-network cost	\$540	\$400
50 hrs/mo-network cost	\$1932-\$2832	\$700

Figure 36 ISDN vs. Glowpoint costs

**The Glowpoint costs assumed here can actually support 512 kbps IP videoconferencing. This makes the comparison somewhat unequal: we believe ISDN users will use 384 kbps, but are unlikely to pay for 512 kbps, even if their endpoints support such bandwidth. At the same time, we are aware that Glowpoint users might actually use 512 kbps; we believe that if users elect to conference as 384 kbps, then Wire One will extend the monthly allowance from 50 hours to 62.5 hours, making the savings potential even greater. However we have not factored this into our analysis here. In truth, we think the quality difference on IP between 384 kbps and 512 kbps is minimal.

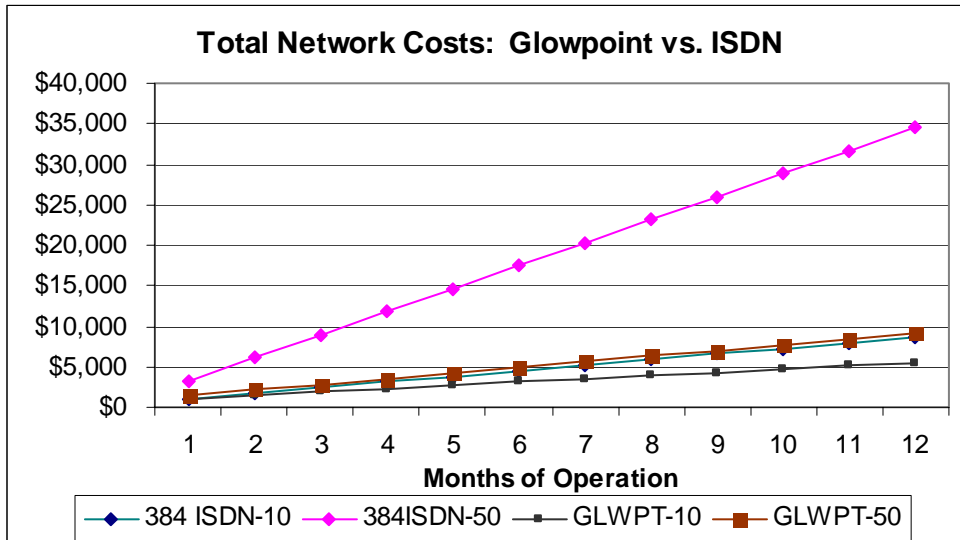


Figure 37 ISDN vs. Glowpoint at different usage levels

The above chart plots the total costs for network usage over the course of a year for ISDN and Glowpoint, assuming 10 and 50 hours of usage/month. The diagram illustrates that the yearly cost for 50 hours of Glowpoint service per month is just slightly higher than the yearly cost for ISDN at 10 hours per month and quite a bit lower than the cost for 50 hours of ISDN per month.

International Calling with Glowpoint

Wire One offers its customers a gateway service (interface between their IP network and ISDN) as a part of their overall network offering. Although the charges for using their gateway are in addition to the other network access fees, customers may realize significant savings by using the Glowpoint IP network to make one leg of the trip and the public ISDN network for the second and final leg. This technique, called long distance bypass, is used by many large organizations to decrease their monthly long distance fees.

To help drive bypass traffic onto their network, Wire One publishes a list of the potential savings that can be realized by using their network and their UK based gateway to place international videoconferencing calls. We have elected to show the representative savings in our table below. A more complete country listing can be obtained directly from www.wireone.com. We believe this analysis assumes the US initiates the call; if the call is initiated outside the US, the figures may change dramatically.

Destination Country	One Hour 384Kbps ISDN Call Originating in USA	One Hour 384kbps Call Via Glowpoint UK POP	Savings	Savings %
Australia	\$571	\$128	\$443	78%
Austria	\$511	\$69	\$442	86%
Bangladesh	\$1,228	\$829	\$398	32%
Belgium	\$509	\$69	\$440	86%
Belize	\$869	\$743	\$126	14%
Cambodia	\$1,897	\$995	\$902	48%
China	\$1,357	\$674	\$683	50%
Denmark	\$516	\$69	\$447	87%
Dominican Republic	\$644	\$505	\$139	22%
Egypt	\$916	\$785	\$131	14%
France	\$396	\$69	\$327	83%
Germany	\$431	\$69	\$362	84%
Greece	\$713	\$169	\$543	76%
Hong Kong	\$792	\$128	\$664	84%
India	\$1,058	\$702	\$356	34%
Israel	\$830	\$252	\$578	70%
Italy	\$582	\$69	\$513	88%
Japan	\$572	\$128	\$445	78%
Netherlands	\$399	\$69	\$330	83%
Norway	\$478	\$69	\$409	86%
Pakistan	\$1,267	\$702	\$566	45%
Poland	\$781	\$169	\$612	78%
Qatar	\$1,073	\$743	\$330	31%
Russia	\$1,177	\$266	\$911	77%
Saudi Arabia	\$807	\$632	\$174	22%
Sweden	\$433	\$69	\$364	84%
Switzerland	\$495	\$69	\$426	86%
Taiwan	\$855	\$674	\$181	21%
Tajikistan	\$1,177	\$591	\$586	50%
Thailand	\$985	\$674	\$311	32%
Tunisia	\$844	\$470	\$374	44%
Turkey	\$812	\$252	\$559	69%
United Kingdom	\$353	\$41	\$311	88%
Uzbekistan	\$1,177	\$546	\$631	54%
Vietnam	\$1,418	\$995	\$423	30%
Yugoslavia	\$825	\$470	\$355	43%
Zaire	\$949	\$802	\$147	16%

Figure 38 International calling on Glowpoint

IP Videoconferencing With IVCi

Founded in 1995, International Video-Conferencing, Inc. (www.ivci.com) is a leading global integrator of video conferencing, streaming and web-based scheduling and management solutions. IVCi provides companies with the means to have face-to-face meetings with customers, vendors and business associates throughout the world without ever having to leave their office.

Operating three offices in New York State, with locations in Atlanta, Los Angeles, San Diego, North Carolina, New England, Salt Lake City and Tampa, in addition to a sister-company with two offices in the United Kingdom, IVCi is well known within the video conferencing industry and represents virtually all of the leading manufacturers in the videoconferencing and the audio/video industry. In addition, the Global Scheduling Solutions division of IVCi has designed and developed the GSS web-based scheduling and resource management software solution designed to centralize conference room reservations throughout any size organization: local, national or global. The company's team of industry professionals has over 20 years experience in conference room design and equipment installation. IVCi offers customers a turn-key partner to satisfy all their multimedia, conferencing, and data collaboration needs.

In early 2002, IVCi introduced IntelliNet, an IP videoconferencing network service. The IntelliNet offering includes a web-based user interface based on the comprehensive GSS scheduling system; a network management system that continuously monitors the health of the network and all the endpoints; and the network itself which is based on the SAVVIS global ATM network which supports four different classes of service on an end-to-end basis. IntelliNet is a class 2 offering. General purpose Internet access is also available, running at class 4.

IntelliNet is a comprehensive video package with one, two, and three-year contract options (at discounted prices). The pricing used here is based on the minimum, one-year agreement with no discount. In addition to the T1-based services, IntelliNet is available with a DS3 local connection to support conferencing at 3 and 6 Mbps. All IntelliNet services are for unlimited usage; there is no hourly fee or transport fee based on bits transmitted or received.

PVC bandwidth	Max. Video Rate	Less than 25 miles from SAVVIS POP	More than 25 miles from SAVVIS POP
512 kbps over T1	384 kbps	\$1,290	\$1,690
768 kbps over T1	512 kbps	\$1,490	\$1,890
1.0 Mbps over T1	768 kbps 2 x 384 kbps 3 x 256 kbps	\$1,590	\$1,990
1.5 Mbps over T1	1.2 Mbps 3 x 384 kbps	\$1,890	\$2,290

Figure 39 IntelliNet Price Structure

The IntelliNet prices include the local loop charges PLUS up to six hours per month per endpoint of 384 kbps bridging. After six hours the fee is \$40/hour. The IntelliNet service also includes free use of the IntelliNet gateways to ISDN; customers pay their own ISDN charges.

Based on the above cost table, we have chosen the IntelliNet 512 service which accommodates conferencing at 384 kbps as the basis for an ISDN cost comparison.

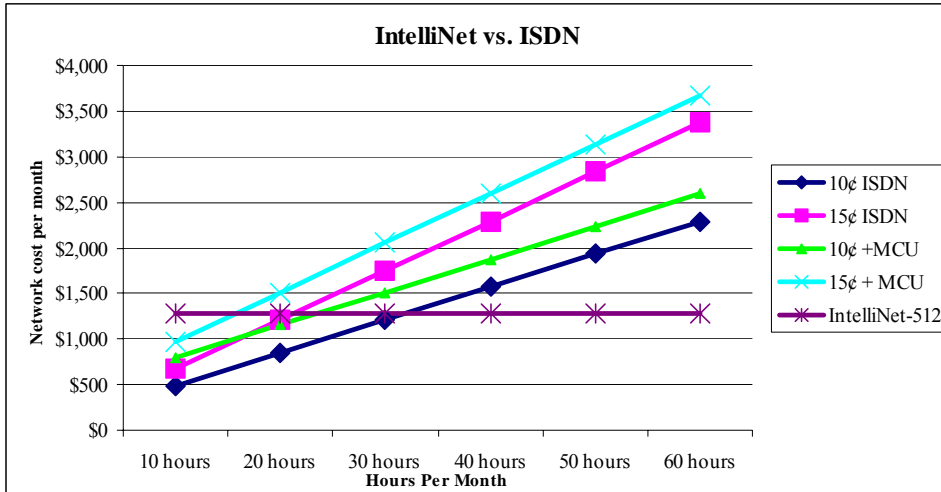


Figure 40 IntelliNet vs. ISDN network costs

The chart shows how the costs compare each month depending on the hours of usage, the amount of bridging, and the competitive fees charges for ISDN services.

As an example of how these costs savings per month can add up, we have calculated the costs for a simple, two-system network used over a two-year period.

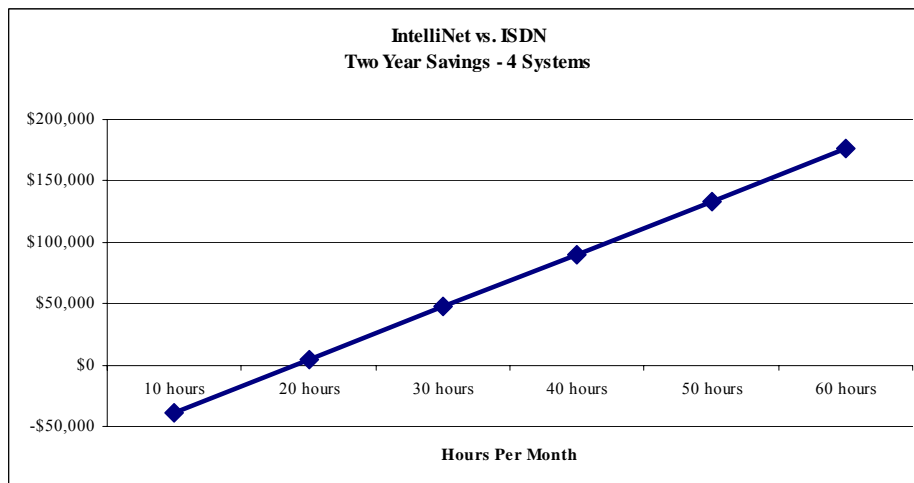


Figure 41 Cost savings with IntelliNet over two years

IP Videoconferencing with Virtela Communications

Virtela (www.virtela.net) is a global managed IP solutions provider that offers TV-quality videoconferencing services within a fully encrypted environment. Virtela offers several flexible packaging schemes including hardware, local loop, WAN, and/or VPN services and simple, flat rate pricing for its video solution – VirtelaVideo. Hence, Virtela can provide 1) a complete, turnkey videoconferencing solution; 2) network connectivity only; or 3) videoconferencing services over the customer’s existing network. Virtela does not require the network to be dedicated exclusively to IP video – the Virtela network supports video, data, voice and Internet communications simultaneously. The fully managed service delivers full motion quality at multiple speeds and is available in more than 200 countries worldwide.

All Virtela services are priced at a flat monthly rate for unlimited use (no complex usage-based charges) and are backed by an array of service level agreements. Virtela guarantees less than 1 millisecond of network jitter – perhaps the most aggressive service commitment in the industry. VirtelaVideo benefits from the Virtela multi-backbone network architecture. Virtela optimizes transport of enterprise traffic across multiple Internet backbones, resulting in greater reliability and performance. Virtela also provides SLAs that guarantee on-site hardware replacement within four hours, worldwide should the customer want this type of bundle.

Virtela’s core VPN service ranges in price from approximately \$300 to \$1,500 per month for each U.S. site, including local loop charges. International locations typically cost from \$500 to \$4,000 per month for each site, including local loop. This solution replaces legacy (Frame Relay) site-to-site connectivity, the need for separate Internet access for each location, and ISDN for videoconferencing. VirtelaVideo is an incremental charge of approximately \$500 per month for each U.S. site for unlimited use; approx. \$1,000 per month for international locations. This fee includes all videoconferencing hardware (including flat-screen TV), policy management and 24x7 NOC support. Virtela also offers ISDN/IP gateway services. All services come with VirtelaView, a web management portal that gives customers real-time visibility (such as jitter, latency, network availability) and control of their network and services.

The data below is for just a few of Virtela’s many pricing models.

Model 1: For customers that have their own video gear and need a fully secure VPN network to support videoconferencing. This model most closely matches the structure of the network services offered by Virtela competitors, although several network providers are also offering packages with bundled equipment. In this model, Virtela provides VPN network services for \$400 to \$1,300/month per U.S. site, depending on speed. This includes the local loop, IP VPN port, Internet access, QoS, management and speeds up to 1,536Kbps. Note that this includes a site-to-site private network that can be used for data, voice and video communications.

Virtela Pricing Model 1 – (U.S.) Network only (includes local loop, IP VPN port, Internet access, QoS, and 24x7 management)

	384K	512K	768K	1,536K
10 hours	\$400	\$600	\$800	\$1,300
20 hours	\$400	\$600	\$800	\$1,300
30 hours	\$400	\$600	\$800	\$1,300
50 hours	\$400	\$600	\$800	\$1,300
Unlimited	\$400	\$600	\$800	\$1,300
ISDN (30 hours)*	\$1,290	\$1,720	\$2,580	\$5,160
Savings @ 30 hours	69%	65%	69%	75%

* assumes \$70/month per 128K ISDN line and \$0.10 per minute usage (per 64K channel)

Figure 42 Virtela pricing – US network only

Virtela's pricing model borders on disruptive, based on the company's belief that it can deliver business quality videoconferencing over the public Internet via its VPN services. Using our typical ISDN cost assumptions, for a 384 connection and given Virtela's fixed price model, a customer would find breakeven at an incredibly low value of 5-8 hours per month. Of course, with a fixed price or fixed cost model, customers will be motivated to use their videoconferencing equipment even more than 5-8 hours/month.

Virtela Pricing Model 1a (International – Major metropolitan cities)

	384K	512K	768K	1,536K	1,984K
10 hours	\$500	\$1,700	\$2,000	\$2,800	\$3,500
20 hours	\$500	\$1,700	\$2,000	\$2,800	\$3,500
30 hours	\$500	\$1,700	\$2,000	\$2,800	\$3,500
50 hours	\$500	\$1,700	\$2,000	\$2,800	\$3,500
Unlimited	\$500	\$1,700	\$2,000	\$2,800	\$3,500
ISDN (30 hours)**	\$5,550	\$7,400	\$11,100	\$22,200	\$28,675
Savings @ 30 hours	91%	77%	82%	87%	88%

** assumes \$50/month per 128K ISDN line and \$0.50/minute usage (per 64K channel)

Figure 43 Virtela pricing – international, major cities

Virtela Pricing Model 1b (International – Second-tier cities)

	384K	512K	768K	1,536K	1,984K
10 hours	\$2,400	\$2,500	\$3,000	\$4,000	\$4,000
20 hours	\$2,400	\$2,500	\$3,000	\$4,000	\$4,000
30 hours	\$2,400	\$2,500	\$3,000	\$4,000	\$4,000
50 hours	\$2,400	\$2,500	\$3,000	\$4,000	\$4,000
Unlimited	\$2,400	\$2,500	\$3,000	\$4,000	\$4,000
ISDN (30 hours)***	\$8,250	\$11,000	\$16,500	\$33,000	\$42,625
Savings @ 30 hours	71%	77%	82%	88%	91%

*** assumes \$50/month per 128K ISDN line and \$0.75/minute usage (per 64K channel)

Figure 44 Virtela pricing – international, minor cities

Model 2: For customers with an existing Internet connection, Virtela provides a videoconferencing service with bundled hardware for \$300 to \$500/month (price varies based on equipment) for each U.S. site. This service includes the following at no charge: encryption, all hardware (including flat-screen TV), policy management, 24x7 NOC support and supports videoconferencing up to 1,536Kbps.

Virtela Pricing Model 2 (U.S.) – Videoconferencing service only (includes encryption, all hardware (including flat-screen TV), policy management, and 24x7 NOC support)

	384K	512K	768K	1536K
10 hours	\$300	\$300	\$500	\$500
20 hours	\$300	\$300	\$500	\$500
30 hours	\$300	\$300	\$500	\$500
50 hours	\$300	\$300	\$500	\$500
Unlimited	\$300	\$300	\$500	\$500
ISDN (30 hours)*	\$1,290	\$1,720	\$2,580	\$5,160
Savings @ 30 hours	77%	83%	81%	90%

* assumes \$70 month per 128K ISDN line and \$0.10/minute usage (per 64K channel)

Figure 45 Virtela pricing, US, video only, no Internet

IP Videoconferencing With Global VideoCom Group

Global VideoCom Group (GVC) is a UK based reseller and integrator of video solutions and systems. Like Wire One, the company believes that IP is the future of videoconferencing and has invested in the infrastructure necessary to become a specialized network service provider for videoconferencing.

Although GVC's network business is in the embryonic stage, GVC is forming alliances with many key network providers including KPN-Qwest, PSInet, Verio, and NTT in order to provide customers with a high-QoS network with a global footprint. Perhaps the most interesting aspect of GVC's business model is their novel pricing scheme of \$500 per month, per end-point. Similar to the Masergy and Glowpoint services, GVC's pricing does not include the local loop connection (i.e. the T1) from the local provider (assumed below to be also \$500). To simplify the deployment of their service, GVC recommends that customers install a separate connection dedicated to videoconferencing. For existing ISDN videoconferencing users, this means replacing their ISDN lines with dedicated IP network lines.

However, the flat rate offering from Global VideoCom includes UNLIMITED point-to-point conferencing (at speeds up to 2 Mbps) and UNLIMITED multipoint video bridging at 384 kbps. This price also includes full access to GVC's web-based scheduling system.

Without considering any potential multipoint usage, the cost calculation for users of the GVC solution might look as follows:

	384 ISDN	Global VideoCom
Installation	\$350	\$1,500
Fixed / Month	\$150	\$1,000
Charge / Min	\$0.90	\$0
10 Hrs/ Month - ISDN	\$540	\$0
20 Hrs / Month - ISDN	\$1,080	\$0
30 Hrs / Month - ISDN	\$1,620	\$0

Figure 46 Global Videocom vs. ISDN prices

If we look at the total costs incurred over the first twelve months for network access charges, the graph looks like the following:

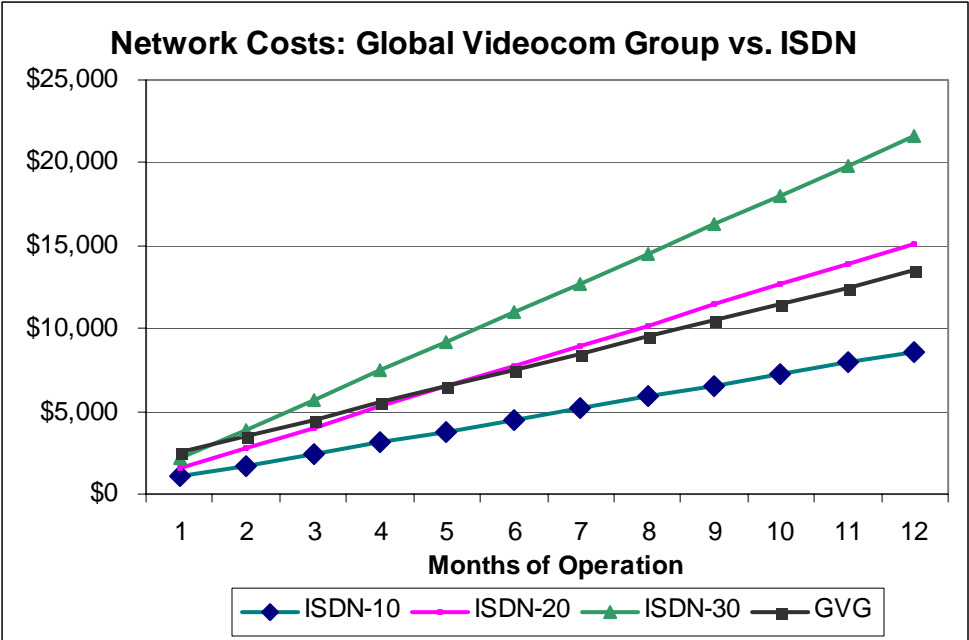


Figure 47 Payback analysis Global Videocom Group vs. ISDN

Obviously, GVC's offering is very attractive if the user is doing more than 20 hours of videoconferencing per month. The GVC service becomes even more interesting if the company is able to negotiate local loop charges of less than the estimated \$500 per month. Furthermore, the fact that GVC's offering includes UNLIMITED multi-point access means that company may be able to avoid the high costs associated with purchasing a video bridge or using an external service provider. For example, a single multi-point meeting including three sites for only one-hour would add \$150 to the monthly bill under the Glowpoint program and probably twice that figure if using an outside ISDN-based service provider. However, in this case, these charges are included in the \$500 per system monthly fee. Hence, if multipoint calls are part of the picture, the breakeven situation with Global Videocom group is much more attractive.

IP Video Conferencing with V-SPAN IP.net

V-SPAN has introduced the IP.net family of IP network services aimed at users seeking premium video performance over public and private IP networks. The services include a quality of service (QoS) service level agreement (SLA) delivering 100% of the video packets in sequence over the network. V-SPAN also offers a full compliment of managed services for IP.net including ISDN gateway and video bridging services. In addition, IP.net is fully integrated with the company's Engage Portal to enable reservationless services and the seamless integration between packet and circuit-switched video networks.

The V-SPAN strategy for a video only broadband network is based on two underlying assumptions. The first assumption is that business quality video demands aggressive deliverables for jitter and packet delivery that exceed the normal performance of best effort backbones; hence the SLA. The second assumption is that a premium overlay network needs to be available at lower entry points for new video adopters. While almost any broadband network can be priced attractively at 50 hours of usage per month, V-SPAN believes that 20 hours per month is a more appealing entry-level tier for the broader videoconferencing market. V-SPAN recommends putting low volume users on ISDN, which can be seamlessly connected to IP-based users via the Engage platform.

V-SPAN's IP.net services are based on full T-1 connectivity and delivered over an MPLS backbone connected to customer's standard routers. The network services carry a MTTR (Mean Time to Repair) of four hours and can support video calls of over one megabit. In order to simplify the price comparison with ISDN and avoid confusion when combining IP and ISDN services, V-SPAN IP.net is made available in a cell-phone like pricing model – and the customer pays whether they are making or receiving calls. The following numbers were provided to Wainhouse Research by V-SPAN

	384k ISDN	V-SPAN IP.net
Installation	\$350	\$1000
Fixed cost/month for network connection	\$150	\$300 for T1
Fixed cost/month for network usage	\$0	\$595/20 hrs. \$895/40 hrs.
Per Minute Charges	\$0.60	\$0
20 hrs ISDN/mo.	\$720	\$0
40 hrs ISDN/mo.	\$1,440	\$0
Total network cost for 20 hrs/mo	\$870	\$895
Total network cost for 40 hrs/mo	\$1,590	\$1,195

Figure 48 V-SPAN IP.net vs. ISDN pricing

As shown in the table, at 20 hours per month the two networks are about the same in price, and in fact the analysis will swing based on the accuracy of the assumptions (\$300/month for a T1 and 10 cents per minute for a B channel call). At 40 hours per month, the customers save approximately \$400 per month, which means that the customer can recover the \$1,000 installation cost in approximately 2 – 3 months.

In addition to the services presented above, the V-SPAN IP.net portfolio accommodates private networks on dedicated facilities, including ATM connections, as part of a fully outsourced managed offering. Because it offers guaranteed QoS, the IP.net network is also suitable for transport of other time sensitive applications, including voice over IP.

Comparison of Network Service Provider Offerings

Given all of the above, it is clear that it can be difficult to compare network services from different service providers. We are reminded of the cell phone model so prevalent today. The fact that different vendors offer different packages based on varying numbers of included minutes, free time zones, long distance packages, and other amenities, makes it almost impossible to conduct a head-to-head comparison of different plans. Some service providers also bundle in endpoint hardware at attractive prices. In addition, different service providers make different guarantees about network performance and have different service level agreements (SLAs), further making a head-to-head comparison difficult. However, by considering only the basic features offered by all providers, we were able to create the following comparison of ISDN and several IP plans.

	Installation (1)	Fixed/Mo (2)	Price/minute	Total Cost 20hrs/month	Total Cost 40hrs/month
384-isdn	\$600	\$150	\$0.12 (5)	\$1014	\$1878
Masergy	\$750	\$600	\$0	\$821	\$1042
Wire One	\$700 (6)	\$0 (6)	\$0	\$580 (7)	\$700
GVC	\$1500	\$1000 (8)	\$0	\$1000	\$1000
V-SPAN	\$750 (9)	\$0 (10)	\$0	\$895	\$1195
Virtela	\$600	\$400 (11)	\$0	\$400	\$400
IVCi	\$500	\$1290 (12)	\$0	\$1290	\$1290

Figure 49 IP video services compared

- 1) The installation charges are assumed, but will vary location by location.
- 2) The fixed costs per month are incurred even if the network is not used. In some cases, vendors bundle in a fixed number of hours
- 3) This is the total cost for using the network for 20 hours / month
- 4) This is the total cost for using the network for 40 hours / month
- 5) We have assumed an intermediate ISDN rate of \$0.12 per B channel per minute
- 6) The Wire One figures assume an SDSL-based installation; T1-based services would be priced higher. The fixed price/month is not broken out by Wire One but is included in the usage prices.
- 7) The 20 hours of usage is calculated assuming the customer has purchased a 10-hour plan and pays extra for the additional 10 hours / month of usage.
- 8) The Global Videocom Group program includes unlimited usage and unlimited bridging services
- 9) Assumes a T1 based service
- 10) V-SPAN fixed prices are included in the 20 and 40 hour monthly prices. V-SPAN also supports burstable data rates up to 768 kbps, making the service effectively higher than 384 kbps typical of ISDN.
- 11) Includes support for fully-encrypted private networking, replacing frame relay, private lines, etc. as well as Internet access.
- 12) Includes 6 hours/month of bridging, GSS scheduling and reservation system, network and endpoint monitoring

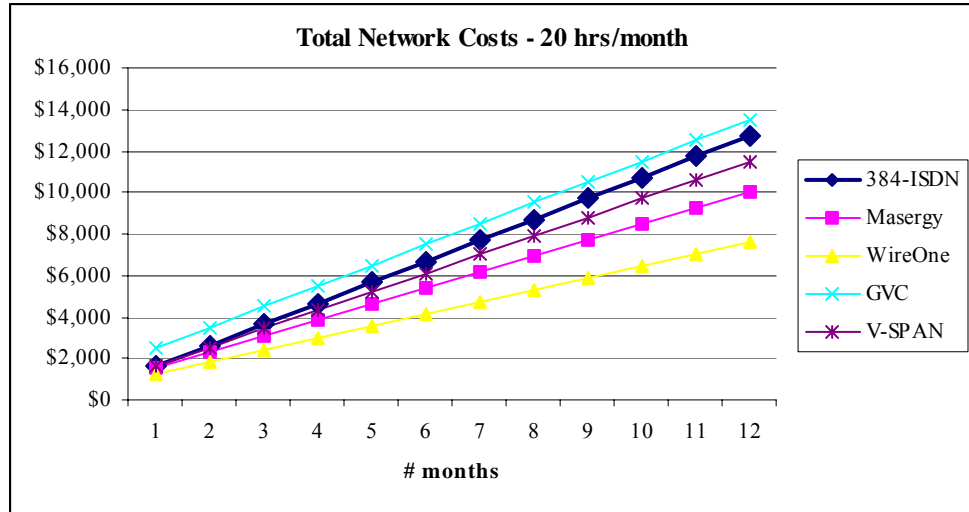


Figure 50 Comparison of network costs: 20 hours/month of videoconferencing

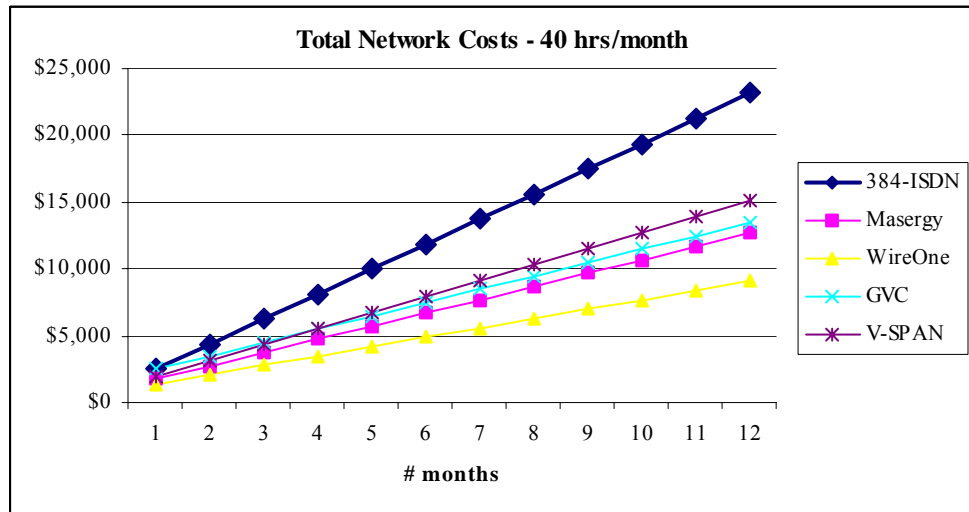


Figure 51 Comparison of network costs: 40 hours/month of videoconferencing

As demonstrated by these two graphs, at 20 hours per month of usage, most of the IP service plans are just slightly less expensive than ISDN. However, at 40 hours per month of usage, the savings of IP videoconferencing vs. ISDN become far more pronounced.

Comparison of Flat Fee Services

Conferencing Rate Supported	384 kbps	512 kbps	768 kbps	Local loop included	MCU included
Masergy	\$850	\$1075	\$1300	No	No
IVCi	\$1290	\$1490	\$1590	Yes	Yes
GlobalVC	\$500	\$500	\$500	No	Yes
Virtela	\$400	\$600	\$800	Yes	No

Figure 52 Comparison of flat rate, unlimited use services

Other Service Provider Considerations

Conferencing and network service providers offer customers a wide range of additional services. Many end users will find these services in the IP environment even more alluring than in the ISDN world. One of the major considerations for customers is whether they are interested in managed services, something offered by some of the service provider vendors discussed above. Managed services allows a vendor to manage all the equipment on a customer's network, whether that equipment is owned by the customer or by a third party. It also includes troubleshooting and guaranteed performance levels.

Additional offerings that service providers may have in their sales toolkit include:

- Turn-key solutions
- Project management
- Network quality of service design
- Equipment selection and installation
- Training
- Technical support
- Acceptance testing
- Call detail reporting
- Room rental services.

Section 9: Conclusions

1. Videoconferencing technology available today presents a viable alternative to many other meeting types and is often a suitable substitute for business travel. Audio and video quality typical for state of the art systems can provide a pleasing conference environment.
2. When used to substitute for business travel, videoconferencing can be justified on the basis of the hard costs savings (airfare, hotels, rental cars, etc.) if the equipment is used frequently.
3. The real benefits of videoconferencing as a travel replacement are evident when a full accounting is done of the soft costs associated with travel – down time from being away from the office is much larger than just the time associated with being in a plane or train.
4. Videoconferencing can be used to achieve many significant benefits besides business travel reduction. Notable examples are reducing time to market by improving team work across distributed resources, shortened hiring cycles for key employees.
5. Videoconferencing should also be viewed as a telephone and travel enhancement – a way to strengthen bonds with remote colleagues and customers between personal visits and between telephone calls.
6. Calculating the true costs of business travel and the true costs of videoconferencing deployment must be done on a case-by-case basis.
7. ISDN is the current installed base leader, but interest in IP conferencing is growing. IP conferencing can be implemented on a converged network (voice, video, data) if adequate bandwidth and quality-of-service measures are installed. The costs for such network improvements must also be evaluated on a case-by-case basis. An attractive alternative IP strategy is to implement an IP overlay network. While the data network and the video network remain separate, they are both IP based and offer advantages in reliability and manageability. The overlay strategy preserves the integrity of the data network.
8. Compared to ISDN, IP networks have a larger fixed cost per month and a lower variable cost per hour of usage. In general, the tradeoff between the two cost curves occurs around 12-18 hours per month. Higher utilization favors IP; lower utilization rates will cost less on ISDN.
9. The market for IP video network providers is an emerging market and the role between integrators, network providers, and bridging providers is still being crystallized. Many business models exist and the proper choice for any end user will depend on his geographic coverage needs and his intended usage rates and calling patterns.

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Appendix 1: Justifying Investments In Videoconferencing

This section provides some further tips on how to prepare documentation to justify an initial or additional investment in videoconferencing technology. The examples given may or may not be relevant to any particular enterprise or organization within the enterprise.

There are multiple ways to analyze the costs and benefits of business travel and its alternatives; each approach has its advantages and disadvantages.

Approach #1 – Per Person / Per Meeting

One approach is to look at individual costs – for employees and for meetings. This approach makes it easy to calculate the hard and soft costs of travel because the focus is on an individual's time, salary, travel expenses, and the number of meetings attended. These variables are relatively easy to determine. However, calculating the total cost of videoconferencing becomes more difficult because the cost of the equipment (purchase, maintenance, support, etc.) must be allocated over an indeterminate number of meetings or individuals.

Calculating Travel Meeting Costs

As described throughout this document, business travel includes both hard and soft costs. Both of these types of costs must be considered when calculating the true cost of a person attending a business travel meeting. Hard costs include:

- Flight costs
- Hotel costs
- Meal and entertainment costs
- Other costs (car service, parking, tips, etc.)

Our research has revealed that a North American based manager will incur hard costs of \$1,334 by attending the average domestic business meeting.

The soft costs (in hours) of business travel include:

- Time invested in logistics (reservations, scheduling, coordination)
- Time spent traveling to and from the airport
- Time spent before the flight
- Time spent in the air
- Time spent collecting one's luggage
- Time spent checking into the hotel / catching up on missed calls and e-mails
- Time spent attending the actual business meeting
- Time spent following-up after the meeting, including filing expense reports, distributing documentation, preparing minutes, etc.

In order to combine the soft costs with the hard costs, the soft costs must be converted from hours invested to dollars spent. This involves calculating the hourly cost of the average business traveler. Throughout this document, a soft cost of \$50 per hour was utilized and is based on an employee earning \$80,000 per year, with a 25% cost for benefits, who works a total of 220 days and nine hours each day.

Since our research indicates that an employee must invest 21 hours of time to attend a domestic travel meeting, we calculate an average soft cost per employee per travel meeting of \$1,050. Combining the hard costs and soft costs yields the following:

Hard Costs:	\$ 1,334
Soft Costs:	\$ 1,050

Therefore, we calculate that the average cost of sending a single employee to a domestic travel meeting is \$ 2,384.

Calculating Video Meeting Costs

To calculate the cost of a video meeting, the following must be considered:

Hard Costs:

- Fixed data line fees (the portion allocated to this particular meeting)
- Fixed costs for videoconferencing support staff (allocated to a meeting)
- Long distance fees / usage fees
- Bridging fees (if applicable)
- Gateway fees (if applicable)

The soft costs of attending a video meeting include:

- Time spent on logistics (reservations, scheduling, etc.)
- Time spent attending the actual business meeting
- Time spent following-up after the meeting, including preparing minutes, etc.

We believe a reasonable estimate for the hard and soft costs might be:

Hard Costs:	\$ 200 per meeting
<u>Soft Costs:</u>	<u>\$ 200 per meeting</u>
Total Costs:	\$ 400 per meeting

However, it should be noted that these costs are highly dependent upon the methods of cost allocation employed by the company, the length of the video meeting, and the per-minute cost of the data lines used.

Calculating The Anticipated Yearly Savings

To calculate the anticipated yearly savings, one must first calculate the per-meeting savings as follows:

Cost of Attending A Business Travel Meeting:	\$ 2,384
<u>Cost of Participating In A Video Meeting:</u>	<u>\$ 400</u>
Estimated Per Meeting Savings:	\$ 1,984

Therefore, converting a single travel meeting to a video meeting will yield a savings of approximately \$2,000 per participant who would have traveled to the travel meeting location.

The WorldCom Study referenced before reports that the average business traveler makes 4.6 trips per month. If we anticipate that the average employee might convert 40% of their trips to videoconferences, they would enjoy a yearly savings of approximately \$44,000 per year.

A company-wide savings can be calculated by multiplying this per person figure by the number of employees participating in this program.

Approach #2 – Total Cost Method

Another, perhaps more direct approach is to focus on the total costs for the department or for the facility. Using this approach, the total cost is equal to the sum of:

- 1) The one time equipment purchase costs plus the installation fees for the equipment and the network
- 2) The fixed monthly costs. These costs are incurred even if no conferencing takes place. Fixed monthly costs include fixed network charges, maintenance, and management overhead.
- 3) The variable monthly costs incurred for using the equipment – typically the network charges.

Clearly, the magnitude of item #3 above will depend almost exclusively on the volume of use, which is based on the number of trips that the company avoids through the use of videoconferencing. One must also consider that not all video meetings are the result of a desire to avoid travel. In other words, the actual volume of video usage will include travel avoidance meetings and telephone upgrade meetings (i.e. meetings that could have been conducted using the telephone, but were converted to videoconferencing).

Using the total cost approach, the total cost of travel is simply the sum of the hard and soft costs for each trip times the number of trips expected (or actually completed). With this approach, which was employed in many of the earlier sections of this report, it is useful to plot the total costs as a function of time and to compare the travel costs vs. the videoconferencing costs noting how the related curves change based on various assumptions.

The disadvantage of this approach is that the total savings are not calculated directly. The savings are, of course, easy to calculate by simply comparing the total costs of the two approaches. The total cost approach does give a better handle, we believe, on risk, since the graph indicates the time to breakeven and the slopes indicate the monthly costs incurred under the two models. Note that neither of these approaches necessarily calculates a total cost of ownership, for which a life expectancy of the equipment need be assumed.

Managers can then evaluate the reasonableness of the situation. For example, in this graph we show how a corporate system costing \$120,000 to install and \$25,000 per month to operate and support compares against corporate travel expenses of \$30,000, \$40,000, and \$50,000 per month.

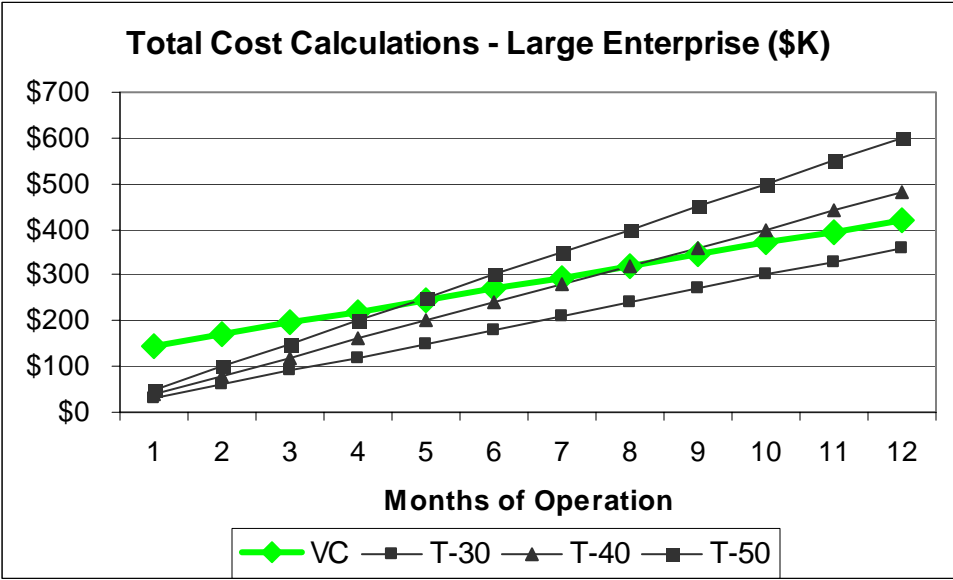


Figure 53 Total cost calculations, travel vs. video for large enterprise

Note that these travel expenses are NOT total travel expenses for a large company, but only what management feels might be replaced by videoconferencing. Given the risks involved, management might feel that a payback of one year is the approve-disapprove cutoff. On the other hand, if many of the intangible benefits are also considered, then a payback of two or even three years might be considered reasonable.

The same situation also applies for smaller companies. In the graph that follows, we demonstrate how a \$30,000 initial investment that costs \$2,200 per month to operate and

maintain might compare to travel savings of \$3,000, \$5,000, and \$7,000 dollars per month.

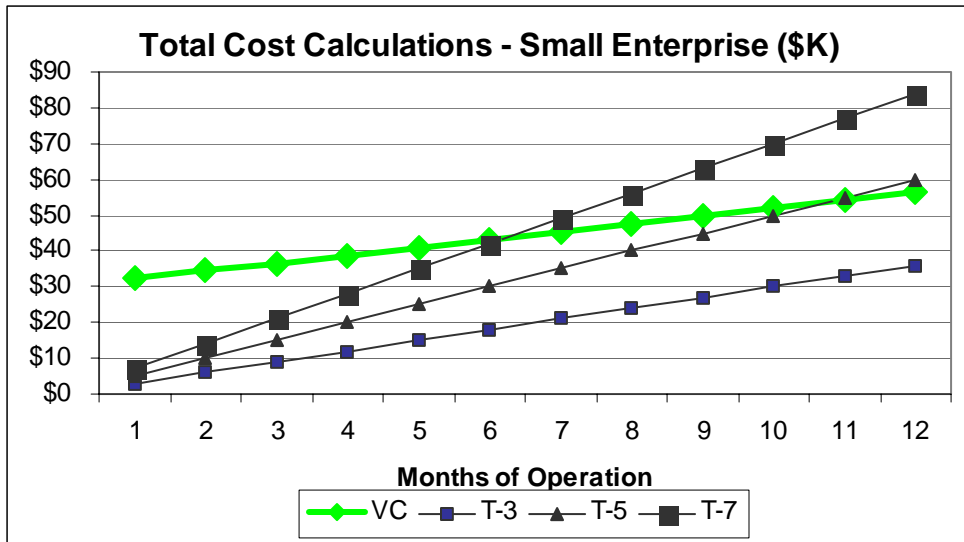


Figure 54 Total cost calculations, travel vs. video for small enterprise

PERSONNEL & PERSONAL IMPLICATIONS

Travel avoidance has many implications for the people involved as well as for the organization. If one person can eliminate 10-20 trips per year through the use of videoconferencing, scaling this program throughout the entire company can yield huge cost and timesavings.

Workdays Saved

Many people feel overworked today – adding to their stress levels, health concerns, and even family life issues. Videoconferencing can save time by eliminating unproductive down time. According to the WorldCom survey, the average travel meeting requires 21 hours while the average video meeting consumes only 4 hours in total. Therefore, the savings per converted meeting, per person, is 17 hours. This means that by converting just one meeting per month, an employee can save an average of two workdays per month. In other words, this results in approximately a 10% productivity boost or a 10% improvement in the quality of life at no additional cost! Similarly, converting just two meetings per month yields almost a full month per year of added productivity and something every business owner dreams about ... a thirteen-month year.

Nights Away From Home

Another interesting calculation, especially for employees with families, is the number of nights away from home that can be saved by using videoconferencing. Nights away from home can be easily calculated based on the travel assumptions made. As described previously, avoiding nights away from home can lead to a less stressful family and community life.