

Making the Best of ISDN-Based Videoconferencing

***A Conferencing Manager's Guide
to Reliable, Cost-Effective
ISDN Videoconferencing***



Making the Best of ISDN-Based Videoconferencing

*A Conferencing Manager's Guide to Reliable, Cost-Effective
ISDN Videoconferencing*

**Ira M. Weinstein
Wainhouse Research**

December 2004



Table of Contents

| | |
|---|-----------|
| The Hype of IP Videoconferencing | 3 |
| Understanding ISDN for Videoconferencing | 5 |
| The Basic Rate Interface (or BRI)..... | 5 |
| The Primary Rate Interface (or PRI) | 6 |
| Strategic ISDN Deployment and Management | 7 |
| Small Office Configuration | 7 |
| Medium-Size Office Configuration..... | 9 |
| Large Office Configuration | 10 |
| Enterprise Configuration | 11 |
| IP / ISDN Gateways and Video Bridges (MCUs) | 13 |
| Other Advantages | 14 |
| Conclusion | 15 |
| About Wainhouse Research | 16 |
| About the Author | 16 |
| About Initia | 16 |

List of Figures

| | |
|---|----|
| Figure 1: A Single 2B + D Basic Rate Interface (BRI) Circuit | 5 |
| Figure 2: A Single 23B + 1D Primary Rate Interface (PRI) Circuit | 6 |
| Figure 3: Small Office Configuration – Using BRI Lines | 7 |
| Figure 4: Cost Basis - Small Office BRI Configuration | 8 |
| Figure 5: Small Office Configuration - Using PRIs and an ISDN Switch..... | 8 |
| Figure 6: Cost Basis - Small Office PRI / ISDN Switch Setup | 8 |
| Figure 7: Medium-Size Office Configuration - Using PRIs and an ISDN Switch | 9 |
| Figure 8: Cost Basis – Medium-Size Office BRI Configuration | 10 |
| Figure 9: Cost Basis – Medium-Size Office PRI / ISDN Switch Setup | 10 |
| Figure 10: Large Office Configuration - Using Redundant PRIs, Telcos, and ISDN Switches | 11 |
| Figure 11: Enterprise Configuration - Using Redundant PRIs and a Dedicated T1 | 11 |
| Figure 12: Calculated Hourly Cost (T1 vs. ISDN) | 12 |
| Figure 13: Calculated Monthly Cost and Savings | 13 |
| Figure 14: Enterprise Configuration - Including MCU and IP / ISDN Gateway..... | 13 |

The Hype of IP Videoconferencing

Since the end of the 1990s, with the ratification of the H.323 standard, the videoconferencing industry became caught-up in the hype of IP-based videoconferencing, and specifically the promise of higher reliability, lower costs, easier network management, and a converged network carrying voice, video, and data traffic. Based on these promises, many organizations shifted their strategic plans toward videoconferencing.

End-user organizations delayed large videoconferencing purchases in hopes of migrating over to IP-based video. Resellers began singing the praises of IP-based videoconferencing to their existing and potential new customers in hopes of re-activating those accounts and soliciting new revenue. Perhaps the most significant item is that most conferencing manufacturers diverted their research and development resources away from ISDN and into IP. This reprioritization of R&D from ISDN to IP slowed the release of various features and functions that could have improved the ISDN videoconferencing experience. In short, the hype of IP video slowed sales, shifted R&D, and generated significant confusion within the conferencing industry.

The above “hype” started in 1999, and continues even five years later. During this period a number of key points became clear:

- 1) IP videoconferencing can be extremely reliable and cost-effective.
- 2) Many organizations are unable to, or appropriately choose not to deploy IP videoconferencing today for various technical, financial, and /or contractual reasons.
- 3) Although the majority of new installations are IP-based today, on an installed systems basis, ISDN remains the dominant network for today’s videoconference meetings - and will likely remain so for quite some time.

In many ways and for many enterprise organizations, IP videoconferencing has been more of a dream than a reality. This is not to say that IP video has not enjoyed notable success in recent years. Quite simply, although IP videoconferencing is the clear path the industry is taking, it just isn’t a viable option for many organizations at this time. Therefore, at least for now, many organizations must continue to use their ISDN network and video systems while striving to maximize performance and cost-effectiveness.

Although most new videoconferencing installations are IP-based, ISDN still remains the dominant network for videoconferencing.

Understanding ISDN for Videoconferencing

The Integrated Services Digital Network (ISDN) is a fully digital service offered by telephone companies to support voice and data applications. The basic building blocks of ISDN are as follows:

- Bearer (or B) Channels - Each bearer channel provides 64 kbps of bandwidth available to carry voice, video, or data traffic.
- Data (or D) Channels – The D channel is used to carry signaling and control information and allows for special features including call setup and termination, hold, conference, and caller ID.

Basically, the B channels carry the data traffic and the D channel controls the flow of data through one or more B channels. Using these building blocks, carriers offer ISDN services in two different flavors; the basic rate interface (or BRI) and the primary rate interface (or PRI).

The Basic Rate Interface (or BRI)

Each Basic Rate Interface (or BRI) circuit provides two B channels (offering a total of 128 kbps of throughput) and a separate 16 kbps D channel. Some people refer to a BRI circuit as a 2B+D circuit. Note that while the total bandwidth of a BRI is actually 144 kbps (2 B channels at 64 kbps each and 1 D channel at 16 kbps), in the video world only the B channel bandwidth (a total of 128 kbps per BRI) is used to carry voice, video, or data traffic.

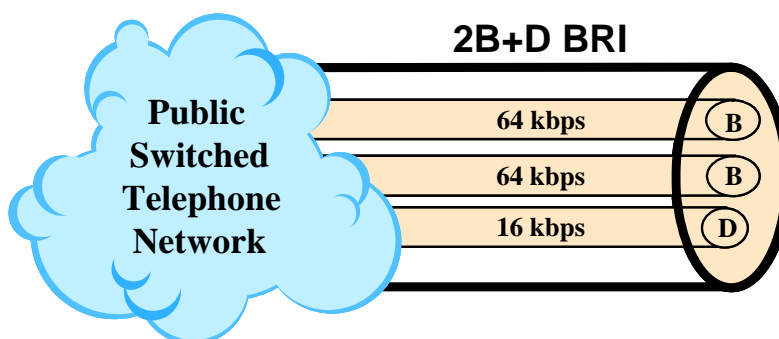


Figure 1: A Single 2B + D Basic Rate Interface (BRI) Circuit

Although the 128 kbps provided by a single BRI line is not paltry, it is not enough bandwidth to provide what most people consider a “business quality” videoconferencing experience. For this reason, several BRI lines are used simultaneously, through a process called “bonding,” to provide higher throughput. A typical business quality videoconference today would use three BRI lines simultaneously for a combined throughput of 384 kbps.

Combining multiple BRI lines together in this manner requires the use of a device called an inverse multiplexer or IMUX. While most recent videoconferencing systems include an embedded IMUX, some legacy systems require the use of an external IMUX, available from various companies including the sponsor of this white paper, to bond together multiple ISDN lines.

The Primary Rate Interface (or PRI)

For environments with one or two video systems, the BRI flavor of ISDN may suffice. In those situations the end-user organization would simply order 3 (or more) BRI lines for each video system. However, for enterprises with a larger video system deployment, deploying three separate data circuits (BRI lines) to each video system is not efficient. In this case, organizations can use one or more primary rate interfaces (PRIs) to deliver the required bandwidth.

Each Primate Rate Interface (or PRI) circuit includes a total of twenty-three (23) B channels (for a total of 1.472 mbps of B channel throughput) and a single 64 kbps D channel. From a throughput perspective, this is the equivalent of delivering 11.5 BRIs worth of bearer channel bandwidth in a single package (and using the same number of wires as a single BRI circuit). To deliver a PRI circuit, service providers deploy a T1 (which provides 1.544 mbps or the equivalent of 24 B channels of bandwidth) and convert one of the B channels into a single D channel. In other words, a T1 is 24B + 0D and a PRI is 23B + 1D.¹ The diagram below shows a typical T1-based PRI.

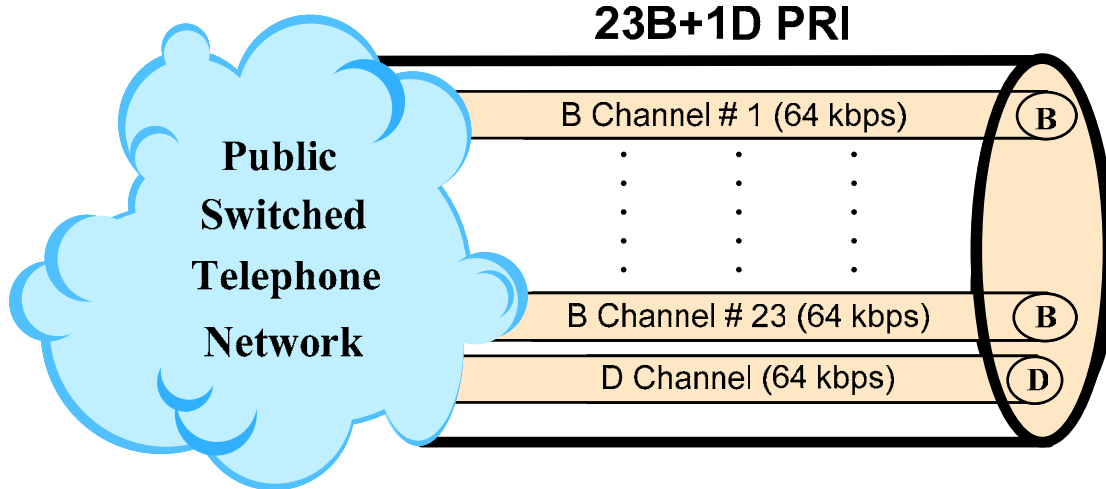


Figure 2: A Single 23B + 1D Primary Rate Interface (PRI) Circuit

A key benefit of using a PRI is the ability to “share” and dynamically allocate the 23 B channels between multiple videoconferencing systems using ISDN switching equipment. In addition, because PRIs are carried on managed T1 trunk lines with uptime guarantees, PRIs are typically more reliable than BRIs, which are intended for residential and small business applications and generally include no performance assurances.

When properly engineered and managed, this type of PRI deployment can provide a strong financial and performance ROI for the host organization.

¹ Note that many countries use E1 trunks instead of T1 to provide PRIs. This allows them to offer either 29B + 1D or 30B + 1D (for a total B channel throughput of 1.920 Mbps) – depending upon the local carrier’s architecture.

Strategic ISDN Deployment and Management

Organizations expecting to continue using ISDN for videoconferencing for the foreseeable future may find opportunities to improve performance and cost-effectiveness by properly architecting their ISDN network. Depending upon the number of buildings, offices, and video systems involved, an appropriate ISDN network re-design may involve the deployment of dedicated ISDN switching hardware and, in many cases, the activation of new (or deactivation of unnecessary) ISDN circuits. This section includes examples of strategic ISDN deployments for small, medium, and large buildings in addition to examples of how dedicated lines and IP to ISDN gateways can further enhance functionality and flexibility.

The following assumptions have been made in the examples that follow.

1) Definition of an Office

From a video networking perspective, a single office or building may actually include multiple buildings or an entire campus connected to a common cabling infrastructure or LAN.

2) Bandwidth Requirements

Each video system should be provided with at least 384 kbps of bandwidth (for business quality video).

3) Network Costs *

1 x BRI = \$55 / month recurring, \$150 install fee

1 x PRI = \$450 / month, \$500 install fee

4) Wiring Costs *

The one-time internal cross-connect / wiring cost per circuit (BRI or PRI) within the enterprise is \$400.

* Network and wiring costs vary by company, service provider, and service location. The figures above are based on the author's experience and information provided by several Fortune 500 organizations.

Small Office Configuration

A small office includes perhaps one or two video systems throughout the facility. The most basic way to deliver ISDN bandwidth to these systems is via individual ISDN lines as shown below.

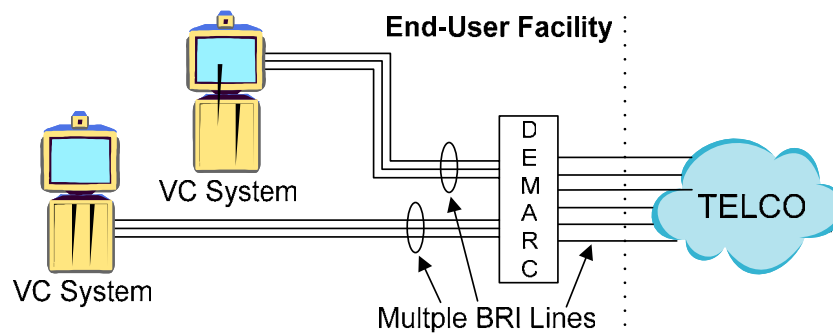


Figure 3: Small Office Configuration – Using BRI Lines

The model shown above is how most small office video systems are connected today. The end-user organization simply orders 3 BRI lines per video system from the telephone company and coordinates the internal wiring between the demarcation point (“demarc”) and the endpoints. The total cost is as follows:

| Item / Circuit | One-Time Cost (Setup) | One-Time Cost (Wiring) | Monthly Recurring |
|----------------|-----------------------|------------------------|-------------------|
| 6 x BRI | 6 x \$150 = \$900 | 6 x \$400 = \$2,400 | 6 x \$55 = \$330 |

Figure 4: Cost Basis - Small Office BRI Configuration

While straightforward, this method involves significant setup costs and provides absolutely no redundancy. In other words, if a single BRI line goes down, the associated video system will lose access to that bandwidth, although the system may still be able to place or receive reduced bandwidth calls. Furthermore, although the firm has purchased a total of six BRI lines from the telephone company, each system has access to only three of those lines, making this a relatively inefficient use of bandwidth.

An alternative architecture for this office would involve the use of an ISDN switch, as shown below and available from numerous companies, including Initia, the sponsor of this white paper.

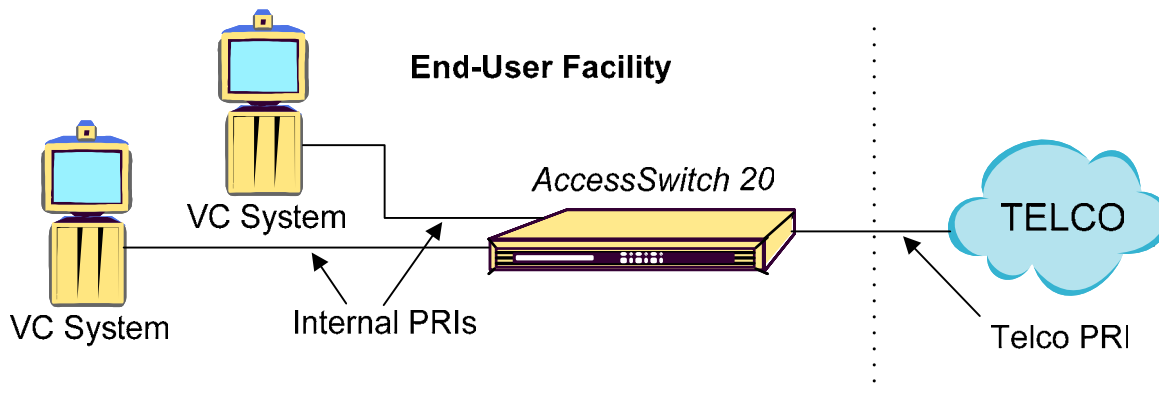


Figure 5: Small Office Configuration - Using PRIs and an ISDN Switch

The major changes from the prior diagram are that all data lines (both from the Telco and those run internally) have been converted to PRI lines and an ISDN switch has been installed. This changes the cost basis to the following:

| Item / Circuit | One-Time Cost (Setup or Purchase) | One-Time Cost (Wiring) | Monthly Recurring |
|-------------------|-----------------------------------|------------------------|-------------------|
| 1 x Ext. PRI | 1 x \$500 = \$500 | Not Applicable | 1 x \$450 = \$450 |
| 2 x Internal PRIs | \$0 | 2 x \$400 = \$800 | \$0 |
| 1 x ISDN Switch | \$7,500 (est.) | N/A | N/A |

Figure 6: Cost Basis - Small Office PRI / ISDN Switch Setup

Switching from the BRI-only configuration to the PRI configuration shown above has increased the one-time costs by almost \$6,000 and the monthly recurring by \$120. That said, there are many advantages afforded by this architecture including:

- Decreased cabling requirements (decreases cable runs from 9 to 3)
- Improved reliability (PRIs are generally more reliable than BRI's)
- Enhanced manageability (ISDN switch provides centralized management for all lines)
- Dynamic bandwidth allocation (each system has access to up to the full PRI of bandwidth)
- The ability to make higher bandwidth calls (depending upon the capability of the endpoint)
- Automatic redundancy (if a single B channel fails, systems can still place full bandwidth calls)
- Free calls between the video systems connected to the switch (allows free test calls, etc.)

The fourth bullet, dynamic bandwidth allocation, is worthy of discussion because it gives each video system access to all of the B channels from the Telco PRI. Whenever a system places a call, it “grabs” as many B channels as it needs for that session, leaving the remaining B channels available for the other video system(s). For example, if one video system placed a 768 kbps video call using 12 B channels, the remaining 11 B channels of the PRI could be used by the other video system(s).

For organizations seeking to maximize reliability and manageability, the benefits offered by the PRI architecture described above may outweigh the negative of the additional one-time and recurring costs.

Medium-Size Office Configuration

A medium-size office may include three or more video endpoints in the same facility. As the number of endpoints increase, so do the potential benefits of ISDN networking. Once again, some users may opt to deploy three (or more) BRI lines from the telephone company to each video system. This is basically an expansion of the topology shown in Figure 3, and involves many individual circuits and cable runs. A better alternative may be the deployment of an ISDN switch as shown in the figure below.

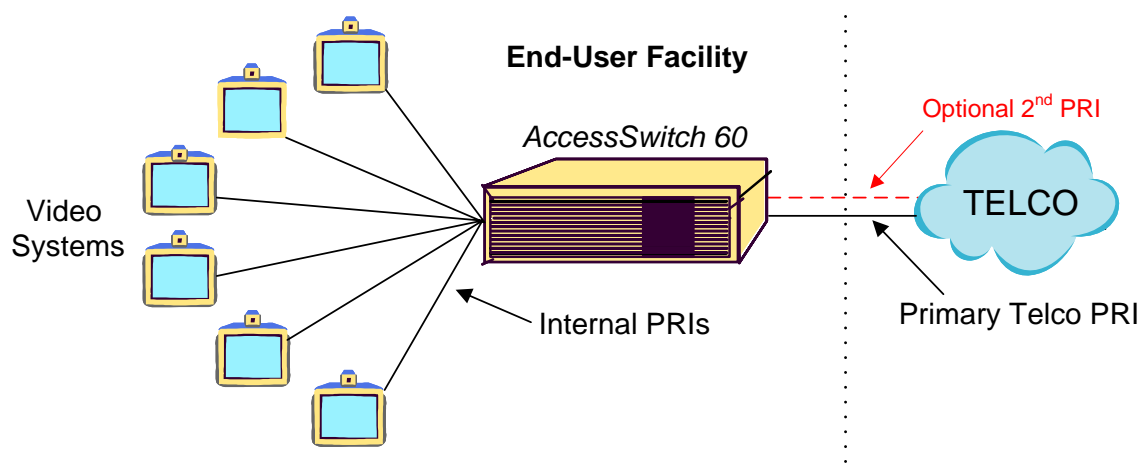


Figure 7: Medium-Size Office Configuration - Using PRIs and an ISDN Switch

This configuration provides all of the benefits of the small office ISDN switch configuration plus the ability to “over-subscribe” the ISDN bandwidth, meaning that the end-user organization can connect additional video systems to the ISDN switch and share all available bandwidth between those video systems. This technique exploits the likelihood that not all video systems will be in a call simultaneously; hence the configuration provides on-demand ISDN bandwidth to a large number of video systems. The result is both flexible and cost-effective as highlighted by the two tables below.

| Item / Circuit | One-Time Cost (Setup) | One-Time Cost (Wiring) | Monthly Recurring |
|-----------------------|------------------------------|-------------------------------|--------------------------|
| 18 BRIs | 18 x \$150 = \$2,700 | 18 x \$400 = \$7,200 | 18 x \$55 = \$990 |

Figure 8: Cost Basis – Medium-Size Office BRI Configuration

The above chart shows the cost basis a six system installation using three BRIs per system.

| Item / Circuit | One-Time Cost (Setup or Purchase) | One-Time Cost (Wiring) | Monthly Recurring |
|-----------------------|--|-------------------------------|--------------------------|
| 1 x Ext. PRI | 1 x \$500 = \$500 | Not Applicable | 1 x \$450 = \$450 |
| 6 x Internal PRIs | \$0 | 6 x \$400 = \$2,400 | \$0 |
| 1 x ISDN Switch | \$20,000 (est.) | N/A | N/A |

Figure 9: Cost Basis – Medium-Size Office PRI / ISDN Switch Setup

As shown in Figure 9, the one-time cost for the PRI / ISDN switch configuration is \$13,000 higher than the direct BRI configuration (\$22,900 vs. \$9,900), but the monthly recurring cost is \$540 less, resulting in a break-even point of roughly 24 months.

The medium office PRI setup also provides an easy expansion path allowing the deployment of additional video systems and/or PRIs. In this case, the Initia AccessSwitch 60 has been configured to support up to eight PRIs in or out. Therefore, an additional PRI (either from the Telco for redundancy or to another video system) could be added without increasing the one-time cost for the ISDN switch. Furthermore, for another \$7,000, the switch could be further expanded to support an additional four PRIs.

Large Office Configuration

For the purposes of this document, a large office includes a significant number of endpoints distributed throughout the facility or campus. In facilities with these types of deployments (and typically high ISDN usage patterns), reliability is a high priority. Therefore, the ISDN network should be engineered to provide redundancy and roll-over capabilities as shown in the figure below.

Note: The use of redundant PRIs (preferably from different network providers), redundant ISDN switches, and redundant PRI interconnects between the two ISDN switches depicted in Figure 10. The result is that even in the face of a major PRI or switch problem, it is likely that every video system will remain accessible through one of the redundant paths.

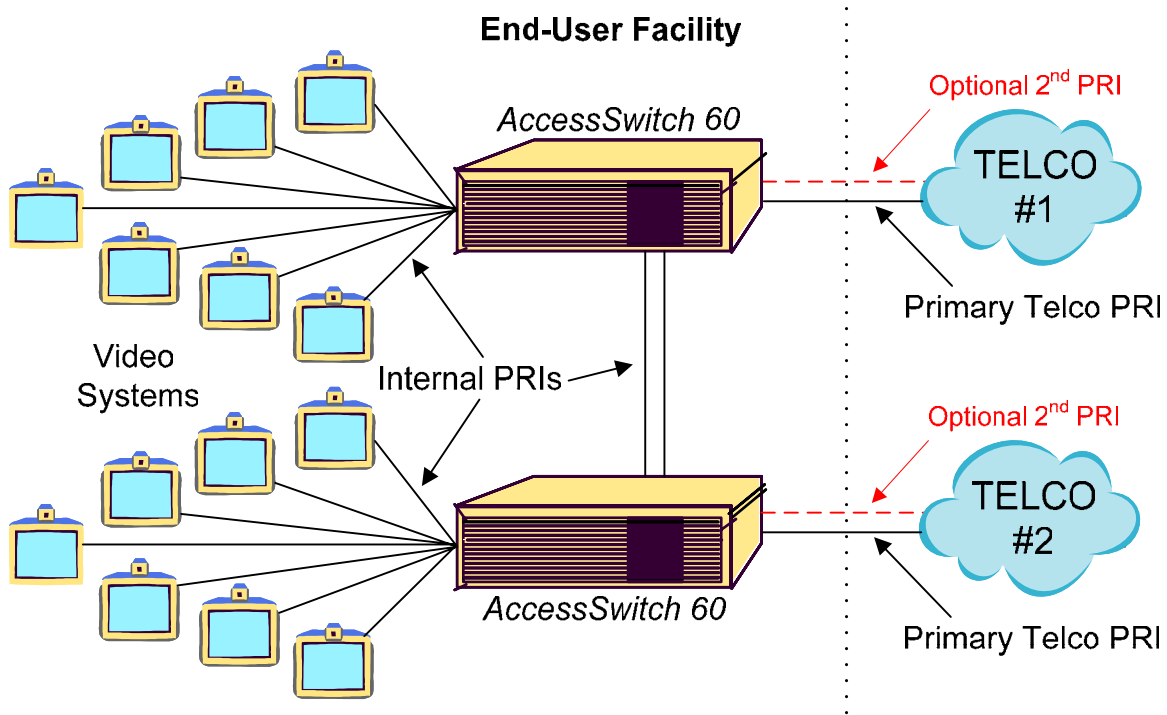


Figure 10: Large Office Configuration - Using Redundant PRIs, Telcos, and ISDN Switches

While not inexpensive (estimated cost of \$40,000 for the required switches), this configuration provides a level of reliability and redundancy appropriate for even the most demanding environments.

Enterprise Configuration

It is common for large organizations to conduct many of their video calls between their largest offices. For example, the New York and London offices of a global investment bank might sport 15 or more video systems in each location, and conduct hundreds of hours of videoconferencing between these facilities each month. Such organizations could enjoy significant monthly savings by properly engineering their ISDN network and through the strategic use of dedicated T1s or a VPN between their large offices.

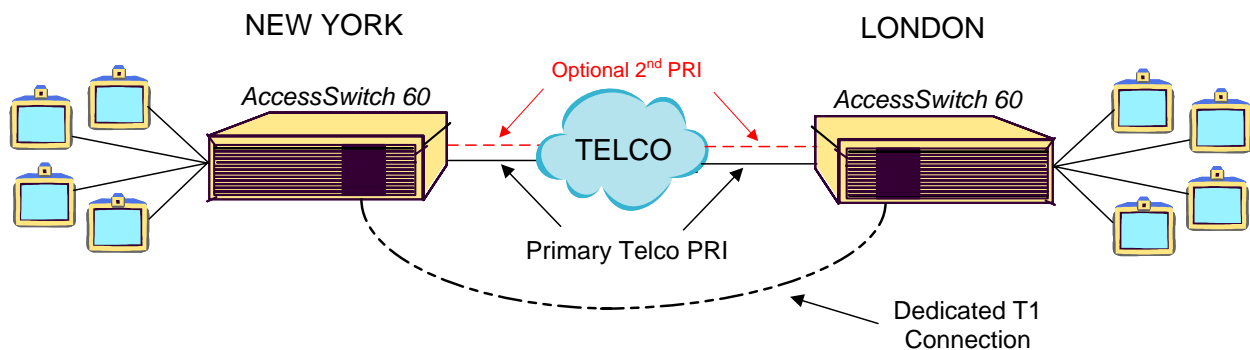


Figure 11: Enterprise Configuration - Using Redundant PRIs and a Dedicated T1

Once again, the above deployment is not inexpensive. However, the ROI may be quite strong depending upon the usage volume and the hourly cost of ISDN connections between the offices. For illustration purposes, let's make the following cost and usage assumptions:

Average hours of video calls between these locations: 100 per month

Standard PRI / ISDN Costs

Monthly PRI Fees (for both offices): \$900
 Hourly ISDN Cost (384k): \$225

T1 / Dedicated Line Costs

One-time spend (switches, T1 install): \$45,000
 Monthly T1 cost (from NY to London): \$5,000

The above data yields the following results:

1) Calculated Hourly Usage Costs

The calculated hourly cost for VC calls between New York and London depends upon the actual hours of usage per month as shown below.

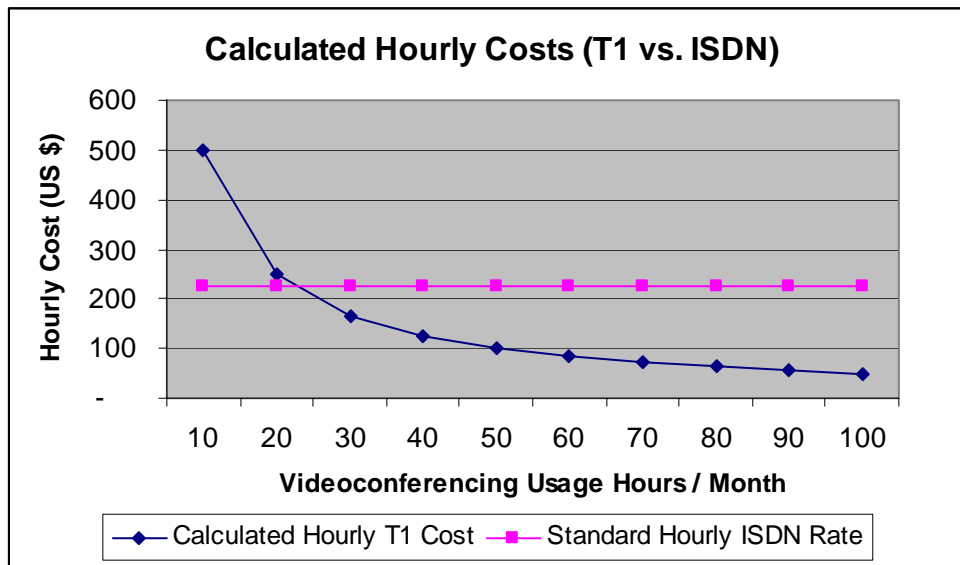


Figure 12: Calculated Hourly Cost (T1 vs. ISDN)

At our assumed 100 hour per month call volume, the calculated hourly T1 cost is only \$50, which is \$175 or 78% lower than the \$225 ISDN hourly rate. The break-even point (at which the calculated hourly T1 cost is equal to the hourly ISDN cost) is roughly 22 hours.

2) Calculated Monthly Savings

The calculated monthly savings from migrating the videoconferencing traffic from a metered (hourly) ISDN service to a pay-one-price dedicated T1 also depends upon monthly usage volume as shown in the next graphic.

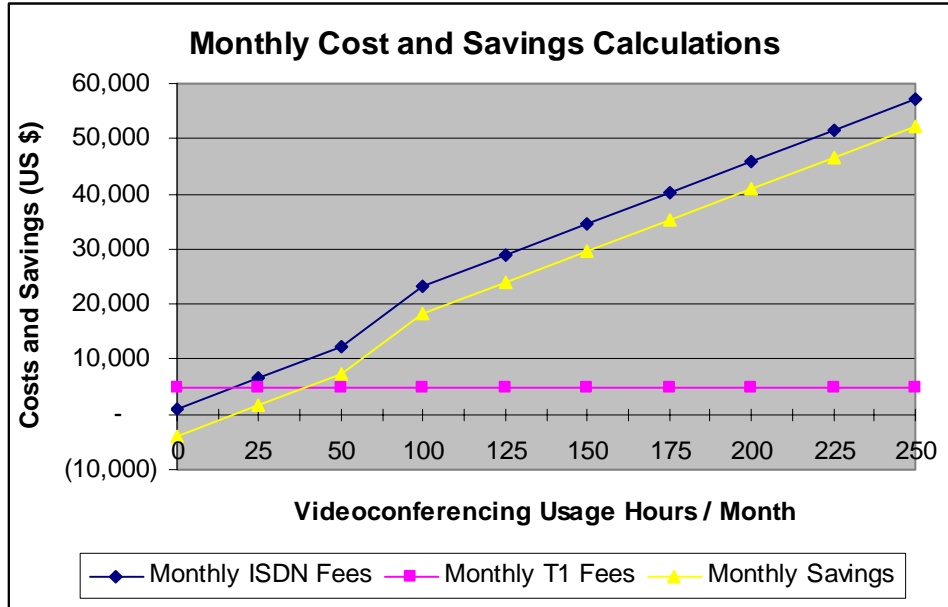


Figure 13: Calculated Monthly Cost and Savings

Based on the above, the organization will save an estimated \$18,400 per month (or \$221,000 per year) in monthly ISDN transport fees by routing their NY to London video traffic over the T1 line. Viewed another way, the payback on the initial \$45,000 one-time investment will be less than 2.5 months!

It's worth mentioning that the hourly T1 cost does not vary by connection speed. Therefore, assuming the T1 bandwidth is available, calls can be made at higher connection rates (512 kbps, 768 kbps, etc.), providing an enhanced user experience at no additional cost.

IP / ISDN Gateways and Video Bridges (MCUs)

A well-designed ISDN video network can support the addition of a variety of infrastructure devices including IP / ISDN gateways and video bridges (MCUs) as shown in the graphic below.

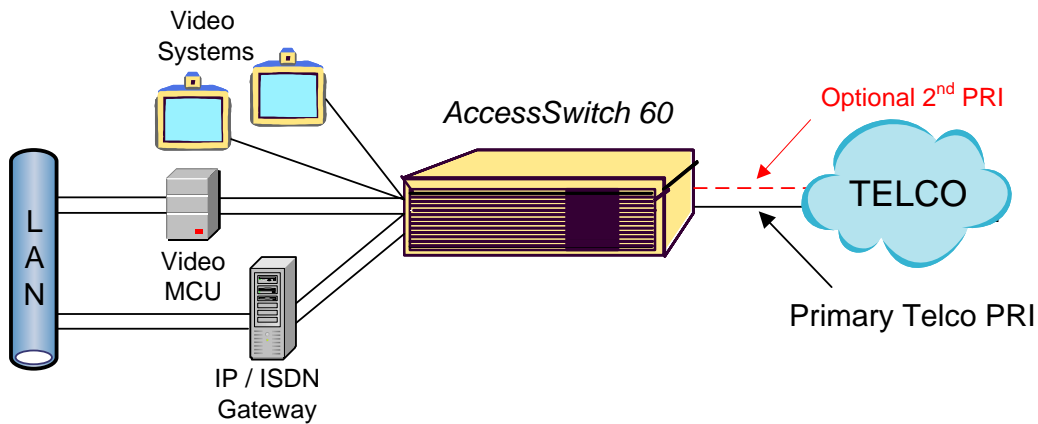


Figure 14: Enterprise Configuration - Including MCU and IP / ISDN Gateway

Connecting these infrastructure devices to the ISDN switch yields a number of advantages including the ability to share the external bandwidth (ISDN PRIs, BRIs, and even dedicated T1s) and connect video systems to the MCU or gateway without incurring long distance fees. Although these benefits may seem trivial, they can provide significant savings for large organizations.

For example, let's assume that an organization has 15 video systems in one of their large offices, and that each system is participating in one hour of multipoint video meetings each day using a service provider's MCU. This means that this organization is placing roughly 330 hours of ISDN video calls from their office to the service provider's location each month (15 systems x 1 hour per day x 22 days per month). If we conservatively estimate an hourly cost of \$40 for these calls, we find that the monthly cost of connecting to the external MCU is more than \$13,000! Neglecting all other potential savings or benefits, this organization could save more than \$150k per year simply by installing an MCU behind the switch in this main office.

Other Advantages

The prior section highlighted some of the advantages of a properly engineered ISDN video network. In addition, there are other benefits that may motivate some end-user organizations to re-design their ISDN deployment – even if they plan to migrate to IP video in the near future.

Extending System Lifespan

A more efficient, manageable, and cost-effective ISDN network has helped many organizations delay the need to upgrade their existing legacy video hardware. For example, by following the basic concept shown in Figure 12, non-IP endpoints can become “IP-capable” via an IP / ISDN gateway. This is especially valuable for organizations with many ISDN or v.35 only endpoints and those enterprises facing tight CAPEX budgets.

Other noteworthy benefits of strategic ISDN networking include the ability to extend endpoint lifespan, centralized security and encryption, simplified billing, and more aggressive pricing.

Security and Encryption

For DoD applications, data encryption using specialized external encryption devices (i.e. KIV units) remains the approved standard. By including these types of encryption units in the ISDN network design, agencies can share encryption devices between many video endpoints and even with an internally deployed video bridge. This is a major benefit for military environments since it allows these users to maintain full security without the need to constantly re-cable their systems or purchase dedicated encryption devices for every endpoint.

Billing and Pricing

End-users report that telephone company bills can be confusing and time consuming to review. This task becomes more complicated with the use of multiple lines (imagine having to review 45 different bills for

the 45 different ISDN lines servicing 15 video endpoints in a single facility). Using PRIs centralizes these bills and all associated long distance fees. In addition, based on this analyst's personal experience, it is easier to negotiate pricing and long distance fees in the PRI world than the BRI world.

Centralized Management

ISDN is a circuit-switched technology meaning that the lines are not used until an ISDN call is initiated. Unfortunately, this means that the readiness status of the lines remains unknown until a call is placed. In addition, because ISDN lines are totally independent of each other, an enterprise with 45 BRI lines (perhaps serving 15 video endpoints) would have to independently monitor and test each of the 45 BRI lines to verify functionality. Fortunately, once connected to an ISDN switch with management capabilities, the ISDN lines can be pro-actively monitored and line problems can be discovered before they impact a video call. Basically, the ISDN switch acts as the central management point for all deployed ISDN lines.

Conclusion

ISDN-based videoconferencing is hardly new. Despite the fact that IP videoconferencing receives most of the limelight in this industry, ISDN remains the dominant network used for videoconferencing today. Thanks to the large installed base of ISDN-only video systems, this is likely to remain so for several years.

Those familiar with ISDN-based videoconferencing are well aware of the inherent reliability and manageability issues of ISDN networks. For many organizations this continues to impact the performance of their internal videoconferencing on a daily basis.

Several companies, including Initia, the sponsor of this white paper, offer ISDN switches and solutions that can help organizations better manage and cost-effectively operate their ISDN networks. In its simplest form, this may involve the use of a small ISDN switch to allow several endpoints to share access to external ISDN lines, the benefits of which include cost savings and a degree of redundancy. For larger ISDN video deployments, several switches can be used together to provide additional bandwidth sharing benefits and switch / Telco redundancy. Furthermore, enterprises may benefit by routing their video traffic between large offices over dedicated, pay-one-monthly-price T1 lines. For additional cost-savings and flexibility, organizations should consider adding ISDN-to-IP gateways and video bridges (MCUs) behind the ISDN switches in one of their large offices.

Instead of tolerating the status-quo mediocre performance of ISDN videoconferencing, organizations should investigate their options for strategic ISDN networking.

The hype of IP videoconferencing has held many conferencing managers in relative limbo for several years. The hope was to delay investing time and funds into improving the existing ISDN network until such a time that IP video could be deployed within the organization. The reality is that many

organizations will not be in a position (technical, political, or other) to migrate their video traffic over to IP for quite some time. Therefore, instead of tolerating the status quo, these organizations should investigate the options for strategic ISDN networking. In many cases, the investments will be more than justified by the potential cost savings and performance enhancements.

About Wainhouse Research

Wainhouse Research (<http://www.wainhouse.com>) is an independent market research firm that focuses on critical issues in rich media communications, videoconferencing, teleconferencing, and streaming media. The company conducts multi-client and custom research studies, consults with end users on key implementation issues, publishes white papers and market statistics, and delivers public and private seminars as well as speaker presentations at industry group meetings. Wainhouse Research publishes *Conferencing Markets & Strategies*, a three-volume study that details the current market trends and major vendor strategies in the multimedia networking infrastructure, endpoints, and services markets, as well as a variety of segment reports, the free newsletter, *The Wainhouse Research Bulletin*, and the PLATINUM (www.wrplatinum.com) content website.

About the Author

Ira M. Weinstein is a Senior Analyst and Consultant at Wainhouse Research, and a 14-year veteran of the conferencing, collaboration and audio-visual industries. Prior to joining Wainhouse Research, Ira was the VP of Marketing and Business Development at IVCi, managed a technology consulting company, and ran the global conferencing department for a Fortune 50 investment bank. Ira's current focus includes IP video conferencing, network service providers, global management systems, scheduling and automation platforms, ROI and technology justification programs, and audio-visual integration. Mr. Weinstein holds a B.S. in Engineering from Lehigh University and is currently pursuing an MBA in Management and Marketing. He can be reached at iweinstein@wainhouse.com.

About Initia

Initia, Inc. is a privately held, full-service communications solutions provider headquartered in Eatontown, New Jersey. Initia acquired the popular AccessSwitch business division from Madge Networks in October 2000, and continues to sell, service and support the AccessSwitch product line.

The Initia family of AccessSwitch products provides standards-based video switching that enables enterprises to cost-effectively deploy, manage, and utilize their ISDN data networks. Initially developed by Teleos Communications, the product line includes off-the-shelf and modular, high-capacity solutions for both small and large enterprises. These products support more than 40 signaling protocols, and are able to consolidate a variety of voice, data and video traffic for seamless LAN / WAN communications.

Additional information about Initia can be found on the company's Web site: <http://www.initiainc.com>.