
An Introduction to AVVID Technology: What is AVVID?

AVVID—An Architecture of Voice, Video, and Integrated Data
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Introduction

I think that it's fair to say that throughout the 1990's, Cisco Systems has made a huge impact on how many companies and individuals do business. From the release of their initial Cisco router product through the design and development of their entire Catalyst switch product line, Cisco has developed a system to transfer TCP/IP traffic—the most commonly known TCP/IP highway being the World-Wide Web. In the late 1990's and now, in the beginning of the 21st century, Cisco has taken their TCP/IP equipment to the next level—the transmission of time-sensitive voice over TCP/IP. This new initiative is what is known to the consumer market as AVVID. AVVID is an acronym that you will hear quite often; in fact, it is an acronym that is changing the way the world does business!

AVVID—An Architecture of Voice, Video, and Integrated Data

AVVID is, quite simply, a Cisco Systems, Inc. acronym that stands for Architecture for Voice, Video, and Integrated Data. In practical terms, it is a network architecture made up of hardware and software to transmit your company's computer data such as e-mail, World -Wide Web traffic, and file transfers; voice traffic, such as a telephone call, say, from your Detroit office to the Dallas office; and your company's video traffic—for example, a video conferencing call or a video training session, over the same physical (and logical) computer network.

Over the past several years, the recommended and requested design by many was to implement three separate networks. A realistic example of this would be a single Frame Relay or Point-to-Point Wide Area Network (WAN) for all of your company's data traffic, a second network consisting of any number of analog or digital trunks and tie lines for voice, and a third network, usually ISDN (Integrated Services Digital Network), infrastructure for video conferencing. As you might expect with three separate networks, the hardware costs are quite high, as are the costs for the circuits, support, and maintenance associated with the individual networks. Cisco Systems, Inc. has developed the AVVID solution that reduces the "multiple infrastructure" approach by combining all of your infrastructures into a single, high-speed TCP/IP network. With this approach, your company's support and maintenance costs, as well as the cost for hardware, is decreased due to the fact that everything can run on one system.

The AVVID Vision

Imagine taking the three networks your company currently has and combining them into a single or *converged* infrastructure. That sounds like it would make managing, budgeting, and staffing somewhat easier, right? Well, that's only a small list of the benefits you'll receive when implementing a converged network. Throughout this book, you will be introduced to new and beneficial technologies that are available from Cisco such as unified and intelligent messaging and communications, and toll bypass. These components of AVVID not only save you hard dollars, but they increase your companies overall performance and response to customer and employee service and support.

Toll Bypass

One example of a cost-saving scenario is a toll-bypass solution seen in Figure 1.1. Let's say your company has two main offices, one in Dallas, Texas, and the other in Detroit, Michigan. Currently the two offices have a single Point-to-Point T1 data infrastructure in place, so they can send e-mail and files back and forth between the two locations. They also have a public telephone network in place. Currently, 80 percent of the calls made at the Dallas branch are long distance calls to the Detroit branch, which results in a monthly telephone bill of \$3000 for each location. An example of a simplistic AVVID solution would be to implement a Voice-Over IP solution at each location. You would simply add a module into the router at each location, giving you the benefit of taking voice, converting the voice to TCP/IP, and shipping it across the data infrastructure you currently have. This is not a completely converged infrastructure, but it is the first step toward becoming a 100 percent AVVID network.

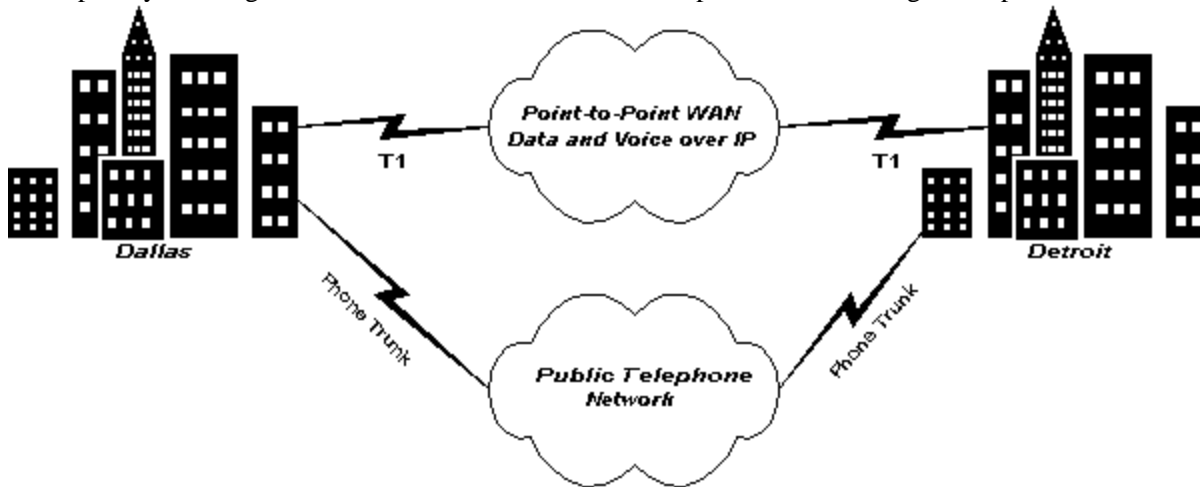


Figure 1.1 A Toll Solutions Bypass

In the previous scenario, each location would still use the existing public telephone network for calls outside of the company, but all of the calls that are placed from Dallas to Detroit would traverse your Point-to-Point network—resulting in a “toll bypass” scenario. By implementing Cisco’s QoS (Quality of Service) at each router, you are guaranteeing that the voice traffic maintains “voice” quality and your data traffic is still sent across the link in a timely, acceptable fashion. So, with virtually no impact to your data traffic, the company depicted would instantly begin saving \$6000 a month on their long distance telephone charges.

Unified Messaging and Unified Communications

Building from our previous example, let’s move on and talk about another beneficial technology that’s available when implementing an AVVID solution—Unified Messaging and Unified Communications. Let’s say that Kevin, in the Dallas location, was expecting a notification from Wayne, in the Detroit location, regarding a highly visible deal that was pending. By implementing a Unified Messaging / Unified Communications solution, Kevin would be able to make the following scenario occur.

Kevin has to leave the office for his afternoon appointment, but is waiting quite anxiously for Wayne’s notification. Kevin configures his Unified Messaging and Communications system to route all calls from Wayne to Kevin’s cellular, but all other calls will be sent to voice mail. Also, Kevin programs his e-mail system to look for messages from Wayne. In the event that one arrives, that e-mail is converted to a voice mail (via text to speech) and forwarded to Kevin’s cellular phone—leaving him the message. This way, Kevin is guaranteed a notification via whatever means Wayne used to get the information over to Kevin, whether it’s e-mail or voice mail.

An AVVID Overview

When explaining the AVVID Architecture, we will be breaking down the pieces and parts that make up the entire solution set into hardware and software. It is important to understand that even though these hardware and software solutions can operate independently of each other, they are still considered a part of the AVVID family. This book outlines how each piece of hardware and each software application function independently, as well as how they interoperate with each other forming a completely converged solution.

Hardware

The AVVID architecture is currently made up of many individual pieces of hardware that can be used together to form and meet any business' required solution. The parts of AVVID range from the Cisco Systems, Inc. router product line, Catalyst switches, IP Telephony Phones, IP Telephony Call Manager Servers, Voice Trunks, Gateways, as well as the individual modules that can be integrated into these devices. It is important to understand that to build an AVVID network, you don't need a set number of pieces of hardware.

Let's review some of the hardware that can be used to construct an AVVID infrastructure.

Cisco Router

Throughout the 1990's, Cisco has led the market share in the TCP/IP router marketplace. As the industry leader in router technology, Cisco Systems has continuously improved and added functionality to develop router technology. Today Cisco's routers can transmit time-sensitive data, as well as time-sensitive voice traffic over a TCP/IP network with an outcome that's more than acceptable! The Cisco router's new look—a "modular" approach—has increased the popularity of the, already, leading industries product. As a member of the AVVID family, the Cisco 1750, 2600 Series, 3600 Series, 7100 Series, 7200 Series, and 7500 Series all support a wide variety of voice modules that give you the functionality of Voice-Over IP technology as well as router-to-traditional PBX connectivity.

Cisco Catalyst Switch

The Cisco Catalyst switch product line has recently been expanded to support, not only high-speed data modules, but a wide variety of voice gateways as well as voice trunks. In addition, the proven data switches have also been redesigned to support special "voice" rated quality of service (QoS). The new models have also been designed to support a cost-effective "line power" model that allows the data switches to provide inline power to an IP Telephony handset over standard Category 5 cabling.

Cisco IP Telephones

At the endpoints, Cisco Systems is currently manufacturing and shipping a variety of Ethernet attached TCP/IP Phone handsets that convert voice to TCP/IP packets and run over industry-standard Category 5 cabling. There are multiple models of the Phone handsets to choose from, ranging from a basic, one-line waiting room handset to a six-line executive handset. The most recent addition to the IP telephony phone product line is an IP-based polycom phone.

Cisco Call Manager Server (MCS 7800)

The heart of IP Telephony is Cisco's Call Manager software solution. The Call Manager software replaces the traditional PBX and is run on Cisco's MCS Server hardware. The Call Manager software is currently running in the 3.x version, which has been much improved from the initial 2.0 version. The Call Manager server runs a modified version of Microsoft Windows 2000 on a Cisco certified platform and can be clustered to provide a larger call volume and a redundant telephone system.

Analog and Digital Gateways

To provide analog or digital connectivity to the PSTN, Cisco has developed an analog gateway device that can support any number of traditional PSTN analog and digital interfaces. The current offerings consist of a stand-alone VG200 Analog gateway as well as multiple modular solutions that interoperate and function within the MCS Server and several of the Catalyst switches.

Voice Trunks

To interface with traditional PBX technology, Cisco currently has a number of digital T1 and primary rate interface (PRI) trunks to choose from, ranging from modules that fit into routers and switches to individual modules that integrate into the Call Manager (MCS) server. Currently, there are a number of modules to choose from depending on whether you need standard T1 signaling, FT1 (fractional T1) or PRI support, but whatever option you're looking for, Cisco has a solution that will fit smoothly into your network.

Voice Modules

As mentioned previously, since Cisco has adopted the modular approach in their router and switch product line, there are multiple models of voice modules to choose from. The many Foreign Exchange Station (FXS), Foreign Exchange Office (FXO), and receive and transmit (E&M) (or ear and mouth) modules can be used in either a Cisco router or a Cisco Catalyst switch to interface with traditional telephony devices.

Software

Within the AVVID software portfolio, there are many, applications that we could touch on. Cisco has specialized in developing enhanced applications that focus on E-Commerce, Customer Care, Workforce Optimization, Supply Chain Management, E-Learning, and E-Publishing. In this book, we will focus on some of the core software products that are currently available. Those products consist of Cisco's Call Manager application, Soft Phone, Web Attendant, and the Active Voice messaging product. To find out more about Cisco's offerings in the software arena please visit the following URL:
<http://www.cisco.com/warp/public/779/ibs/>.

Call Manager 3.0

Cisco's proprietary Call Manager application was developed as a means to provide functionality within an IP Telephony network. The Call Manager application provides the call setup and teardown functionality as well as call routing within an IP Telephony network. Currently, the Call Manager application runs on the Cisco MCS Server and can be clustered with multiple MCS Servers to provide a higher level of call volume or an added layer of redundancy.

Soft Phone

The soft phone application is an application developed to provide clients with a phone that runs within software. This application can be installed on any PC that connects to an IP Telephony network. Once installed, the end user (the person placing call on softphone) needs a regular handset to hear and speak, but dials the calls from a PC. The client or end user has the touch and feel of a regular handset except that it is running in software. This client can then receive and place IP Telephony calls over an Ethernet network infrastructure.

Web Attendant

The Web Attendant is an application that runs in conjunction with Call Manager, giving an office assistant a GUI/Web-based program that can be used for call pickup and transfer. Instead of the cumbersome hardware that some office assistance utilizes, the Web Attendant is a software application that runs on a desktop PC. When a call needs to be received or rerouted, the office assistant uses the "click and drag" method to successfully process the call.

Active Voice

Cisco has recently purchased a company by the name of Active Voice. They provide an enhanced unified messaging product that has been, and currently is, the industry leader. The Unity product provides a voice messaging and unified messaging (interaction with fax and e-mail) solution that functions on an IP Telephony network. This product, in conjunction with Cisco's IP Telephony hardware and Call Manager application, guarantees complete functionality of call processing, voice messaging and unified communications with interaction with email and fax.

The Converged Infrastructure

When discussing AVVID, it is important to understand what we mean by a *converged network*. It is also important to understand how a network can be converted from an "old school" infrastructure to a "new age" AVVID or *converged* infrastructure. When implementing an AVVID solution, most businesses or institutions are going to determine what is feasible based on resources and cost. They will review their annual budget and staffing to determine how quickly they can afford to move forward. There are some expenses that need to be addressed. If a company is looking to implement an infrastructure from the ground up, it is definitely cost-justifiable to

implement a completely converged system. However, in a scenario where an existing (legacy) voice network, video system, and data infrastructure is in place, a migration approach is usually needed. Cisco has developed a phased approach that can and should be followed when converting to a converged infrastructure. Briefly, we'll take a look at the three stages that can be used when implementing an AVVID infrastructure.

NOTE

We'll be discussing AVVID implementations on a much more technical level throughout the rest of the book. The AVVID implementations illustrated in this chapter are intended provide a basic overview of how a converged infrastructure *can* be utilized an implemented.

Phase One—Legacy Voice System with Toll Bypass Benefits

The first phase when converting an existing network to a completely converged AVVID infrastructure focuses on your data network. In this phase, your existing voice network will remain in place, but you will be able to utilize your data infrastructure for benefits like toll bypass. Figure 1.2 is a diagram of an existing infrastructure that is not utilizing AVVID technology. It is a two-site network that currently uses a proprietary (legacy) voice system (as well as voice mail). There are trunks into the public switched telephone network (PSTN) for voice and video (BRI), and a T1 between locations for data-only traffic.

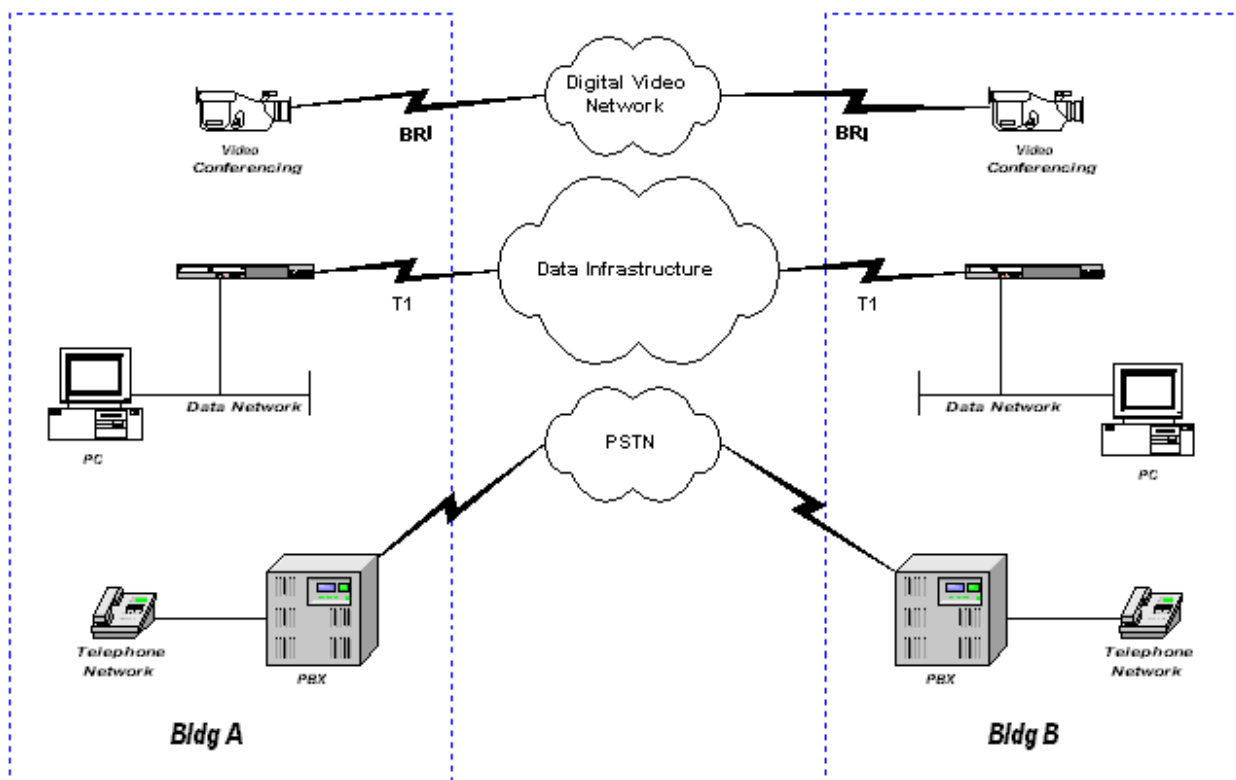


Figure 1.2 An Existing Infrastructure Before an AVVID Implementation.

To begin the first part of the conversion phase (see Figure 1.3), the first step is to take advantage of Voice- and Video-Over IP. You will instantly gain the benefits of Voice-Over IP. This benefit is justifiable only if the two locations utilized PSTN long distance. This is done by implementing a gateway (module) into the Cisco router(s) or switch(s) located at the edges of the WAN. You will also need to convert your video network, which is usually H.320, into an Ethernet standard for video, which is H.323. The H.320 to H.323 conversion can be performed by implementing a device called a Video Terminal Adapter (VTA) at the edges of the existing video network. This lets your video system utilize the Ethernet network instead of utilizing your ISDN infrastructure.

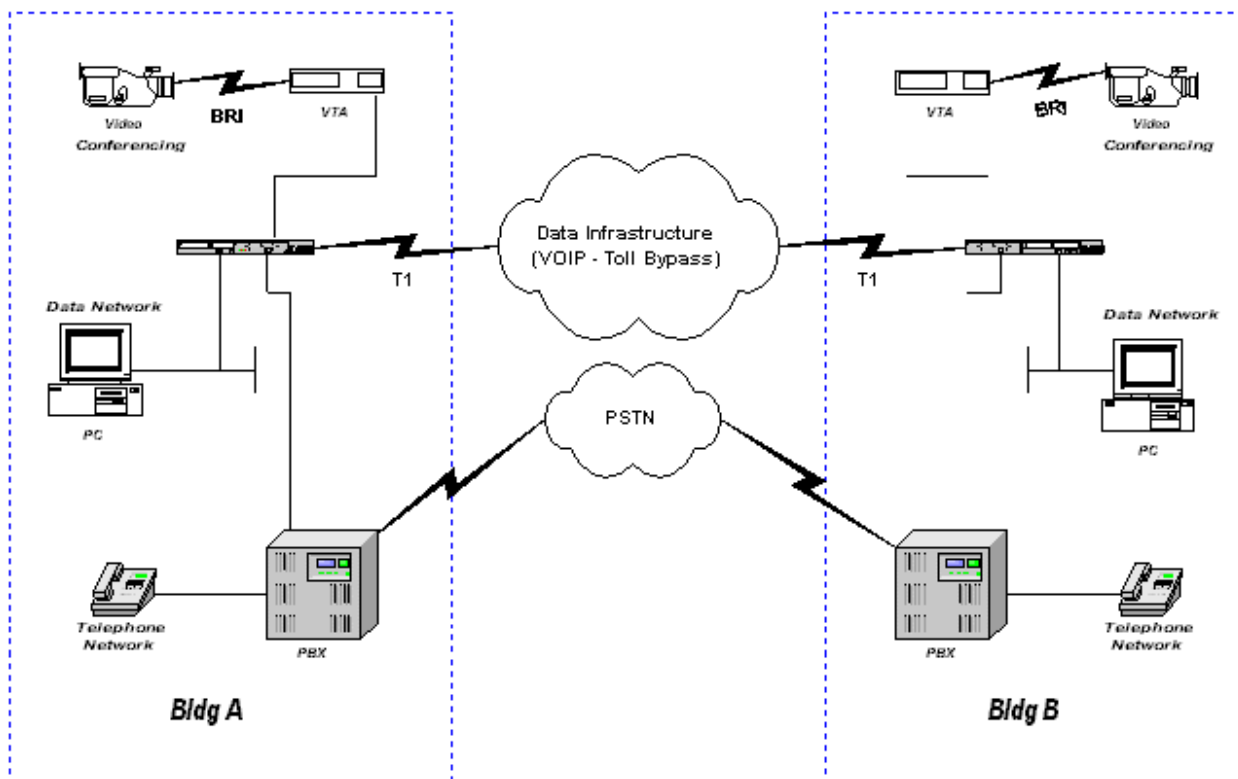


Figure 1.3 Using Voice- and Video-Over IP

Phase Two—Legacy Voice System and IP Telephony in Parallel

The second phase in an AVVID conversion (shown in Figure 1.4) is to implement an IP Telephony network in parallel to the existing infrastructure. This is accomplished by adding a Call Manager server, IP Telephones, and an IP telephony gateway at each location. In this scenario, it is being displayed as a gateway/trunk module in a Layer 3 core switch. This phase allows you to utilize the IP Telephones and the Call Manager server for functionality, and allows you to maintain existing legacy telephones with their private branch exchange (PBX). This design still takes advantage of the toll bypass as well as gives the end user a migration path from legacy telephony to a complete IP telephony system. This phase and scenario will also require two separate voice mail systems—an Active Voice solution for the IP Telephony system and a proprietary voice mail system for existing telephones.

TIP

Depending on the type of existing voice mail system you had in place, it may be possible to interconnect the two systems together, allowing them to communicate with each other.

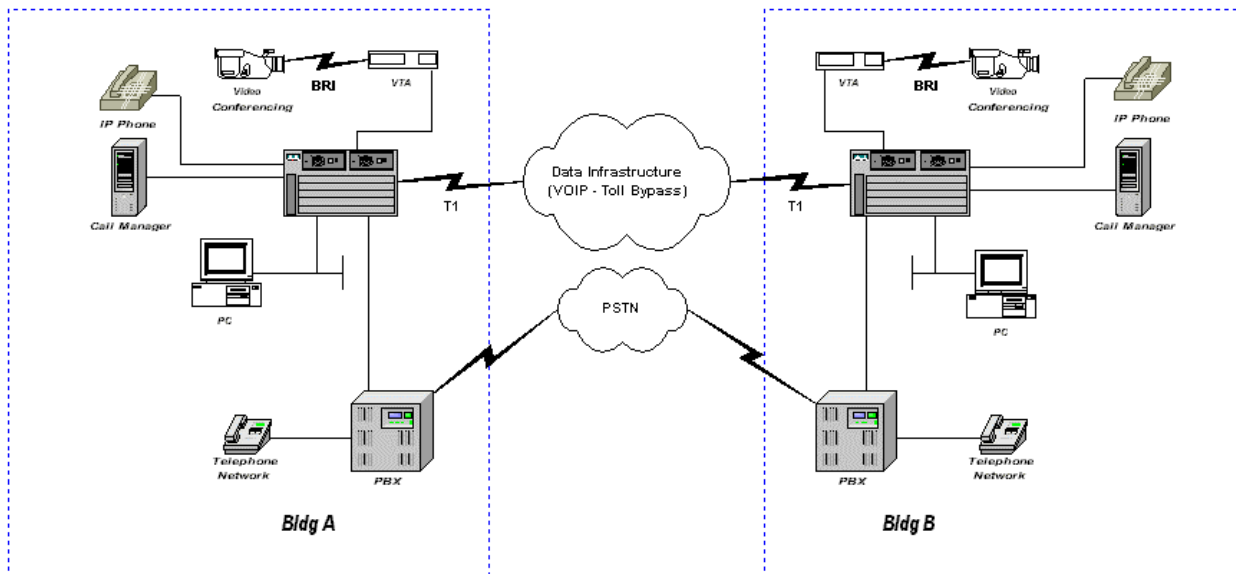


Figure 1.4 Implement an IP Telephony Network in Parallel to the Existing Infrastructure

Phase Three—A Converged Infrastructure

The final phase is to remove the legacy voice system and utilize a 100 percent IP telephony/ converged infrastructure. In Figure 1.5, we see a core Layer 3 switch with analog or digital PSTN access. We also see the Cisco Call Manager server (MCS) as well as IP Phone handsets and IP desktops. The video network is also being converted from H.320 to H.323 over Ethernet via the Video Terminal Adapter (VTA).

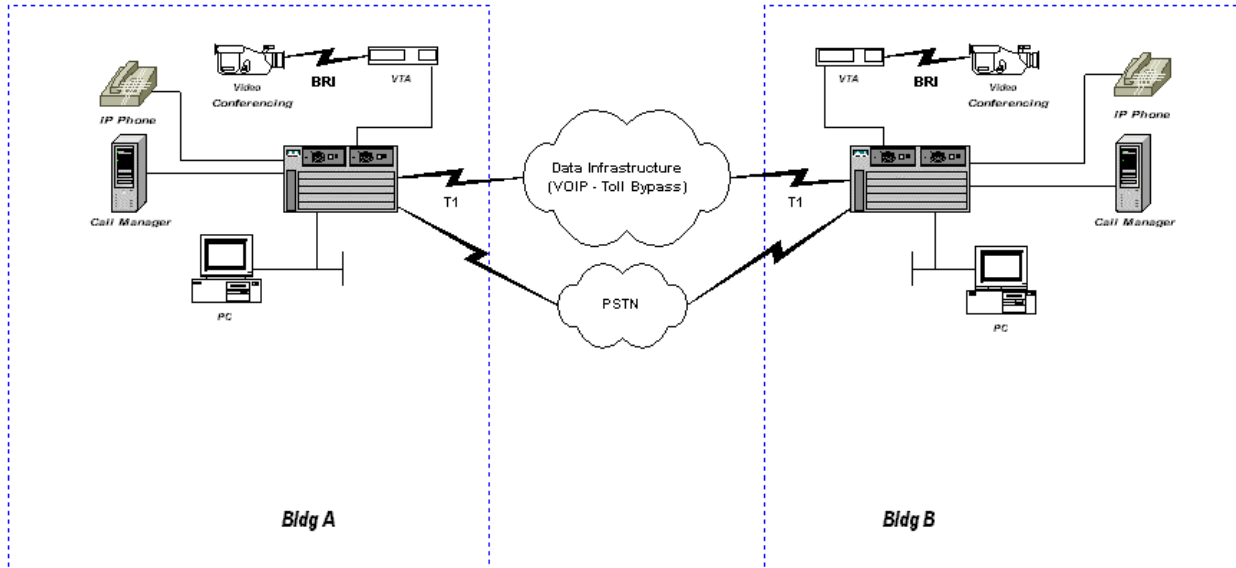


Figure 1.5 The Final Phase of an AVVID Migration

Summary

As you read through this book, you'll be introduced to different pieces of AVVID beginning with the hardware and then the software. It is important to look at the "bigger picture" and understand the overall solution to fully realize what AVVID brings to the table. There are many individual pieces to the AVVID family, but the real benefit is what a complete infrastructure will bring to your company or organization in the areas of reduced network redundancy, overall cost savings, employee productivity, as well as customer and employee satisfaction.

FAQs

Q: Do I need to purchase all new equipment to implement an IP Telephony network?

A: That depends on the model of routers and switches that you're currently using. If you are using models that have been purchased within the last 10 to 16 months, chances are that you're using a modular solution. In this case, you will probably only need a software upgrade as well as an additional module for voice support. If you are looking to power line phones, you can use your existing switched infrastructure, but you will need to provide an alternate method of phone power via the external patch panel or a standard power supply. You will then need to purchase the Cisco Call Manager application, the MCS Server that the application runs on and the number of needed IP Telephone handsets you require.

Q: I have heard the terms "IP Telephony" and "Voice over IP." Do they mean the same thing?

A: Not exactly. The term "IP Telephony" conceptually depicts a switched LAN, a Call Manager server and IP Phones within a building or local campus. "Voice over IP," on the other hand, is the term for taking voice traffic at one location, converting it over to TCP/IP packets and shipping it across a Wide-Area-Network (WAN) to another geographical location for the benefits of toll-bypass.

Q: Is anybody running Voice over IP or IP Telephony today?

A: Yes, in fact, statistics from Cisco, Lucent, and Nortel show that businesses or corporations that are in the process of implementing a new telephone system from the round up are choosing an IP Telephony solution because of the benefits in cost and support.

Q: If the Call Manager application is running on Windows 2000, what if the Operating System (OS) fails? We've all seen the "blue screen of death."

A: Cisco has developed a redundant model. If your system requires 100 percent uptime, a redundant Call Manager Server should be installed. Your phones can be configured to register and operate with multiple Call Manager servers anywhere in the network.

Q: If I have a two-site network with a Wide Area Network (WAN) connection between them do I need two separate Call Managers?

A: No, you don't *need* two separate Call Manager servers. As long as your IP Telephones have IP connectivity to the Call Manager (even over a WAN), your system will still operate smoothly. However, if the WAN link goes down, the remote phones will not be able to register and operate successfully.



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