# The Power of IP Video

## Unleashing Productivity with Visual Networking

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# Introduction

Video changes everything!

When we think about the evolution of business communications, we first think about the telephone, text-based email systems, voice mail, text messaging, and voice conferencing. As businesses migrated to converged IP networks, we saw more integrated voice/web/videoconferencing, video streaming, instant messaging, and the start of integrated communications enter the business environment.

Today, we hear about quad-play technologies, Unified Communications solutions, TelePresence, IP video surveillance, video portals, Web 2.0 mash-ups, and various solutions developed to address a variety of business needs, all leading to visual networking. The use of IP video to transform business is a growing trend, and large companies or public institutions that want to remain competitive need to prepare for change!

## What Is Visual Networking and Why Is It Important?

In the simplest terms, visual networking is the combination of digital video and social-networking (Web 2.0) technologies. It also includes various traditional video applications such as conferencing and streaming that enable communications, collaboration, and new business models. In terms of trends, IP video combined with interactivity promises to make the video experience measurably distinct and improved from the passive video viewing experience with traditional media. And the possibility of making video interactivity pervasive across web, mobility, and IPTV (next-generation TV) platforms promises even greater engagement and responsiveness for audiences.

So why is visual networking important? From a business perspective, the combination of Web 2.0 technologies and IP video means that your teams will be able to interact and collaborate in a meaningful way from anywhere in the world. Thus, businesses can have an unprecedented level of agility. Teams can form dynamically around an opportunity, rapidly build rapport, begin developing solutions, and then be repurposed to a new opportunity. Physically "being there" is no longer a requirement.

A few Internet video trends highlight the growing acceptance of this form of communication. In 2005, 9 billion video streams were served over the Internet,

and in 2006, that number rose to 31 billion streams. By December 2007, in only 1 month, 10 billion video streams were served— (more than all of 2005)! Video now accounts for 60 percent of Cisco internal network traffic; and although we are an obvious early adopter of these technologies, it is a sign of changes to come.

In 2008, another video trend was established. NBC Universal captured more than 3600 hours of video from the 2008 Olympic Games (more video than all other Summer Games combined)! Viewers were able to watch video recordings online via the Internet of events that had never been broadcast before. By 2010, corporate TelePresence traffic is expected to generate more traffic than the entire Internet backbone in 2000. All of these trends demonstrate the growth of IP video and indicate a need for even greater Internet bandwidth.

From a product perspective, these trends keep Cisco focused on video as a strategic priority, and require a next-generation platform to manage the expected demand. The network is the platform to provide new video experiences; and content creators, aggregators, service providers, and consumers are all stakeholders in creating these experiences.

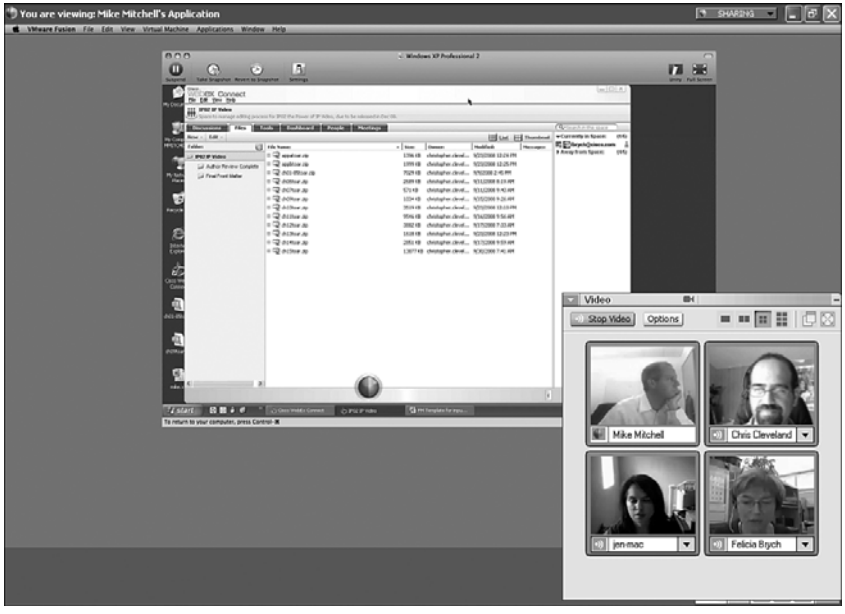
## What Is This Book About and Why Are We Writing It?

The purpose of this book is to share with you potential business value from the use of IP video and visual networking in enterprise and public sector environments. Examples, case studies, and quotations are used throughout the text to describe the Cisco experience, or in some cases the Cisco evolution, in our use of IP video to engage employees, partners, and customers. We also describe how IP video is changing customers' businesses or services within several industries. The examples demonstrate how visual networking is used to increase agility, cut operational costs, improve communications, grow revenue, and create new competitive advantages.

Besides the examples and case studies, we also provide an introduction to quad-play technologies (voice, video, web, and mobility applications) and describe how they are changing today's workplace. Employees are able to conduct business, regardless of location, as long as there is an Internet or appropriate smartphone connection. In the summary chapters, we cover many visual networking use cases and discuss the future of visual networking, particularly as it relates to green initiatives (the new global priority).

As authors, our experience crosses many viewpoints about video as product managers, marketing experts, business sponsors, IT managers, end users, and teleworkers. We have either planned, developed, deployed, or used all Cisco video or video-related products, and we see how the integration with social-networking applications is changing how we do business.

As an authoring team, we make use of visual networking wherever we can, whether contributing to a blog about the book or conducting a review session with our Cisco Press team members. We've included here a recent picture of Jennifer, Mike, Felicia, and Chris using our USB cameras and WebEx Meeting Center to conduct a meeting about this book and share our video. Jennifer and Chris are both full-time teleworkers, but by using visual networking tools, they are just as connected to their team members as if they were sitting in the next cubicle. Chapters 1 and 2 explore this concept of enabling remote work and more efficient communications through quad-play solutions.



## Who Should Read This Book?

The focus of this book is on the business value created from IP video in an enterprise or public sector environment. It does not cover the technology considerations for implementing the individual technologies. Based on this business focus, CxOs, business decision makers, managers, business process experts, communicators, and strategic planners from any functional discipline, within any industry, will benefit from the examples and best practices shared in this text.

We assume you will be able to apply these examples to your business and identify how you might be able to improve communications, cut costs, or even transform your business to grow revenue. At the very least, the examples will show you what Cisco and other companies are experiencing and might spark some new thinking.

## Visual Networking to Transform Business

Across many industries, visual networking is creating positive opportunities to improve business. The most natural example is improving communications within a corporation, which can be as simple as deploying video blogs to enable one-to-many communications, or can be more complex such as deploying video telephony to enable better one-to-one communications. Either way, the visual queues available through video provide a richness to the communication that is not present through audio or text alone. Video increases the impact and retention of the message and helps build trust.

In the education space, organizations are globally deploying video technologies to transform learning and education management. The current use of IP video has enabled innovation of learning for career advancement and to enrich the classroom. The University of California - Berkeley uses it to reach dispersed learners via podcasts, delivering content to students both on and off campus. IP video is also being leveraged to secure campuses and schools, thus fostering safer learning environments.

With regard to the financial services sector, we discuss how a major U.S. bank implemented IPTV as a new training method, accelerating new product revenues by nearly 25 percent. This initiative achieved a return on investment in less than one quarter! The bank also uses the IPTV solution to improve corporate communications and share best practices among its sales associates. Several other

U.S. financial institutions are also using IP videoconferencing and TelePresence to improve business relationship, extend expertise to customers, grow revenue, and reduce travel.

Besides the traditional use of video to improve communication and collaboration between staff and hospitals, the healthcare industry is finding innovative ways to improve patient care by increasing access to medical expertise. The University of California Los Angeles (UCLA) and Johns Hopkins medical facilities are using InTouch Remote Presence Robots to enable doctors to project themselves to another location via remote-controlled mobile robots: to move, see, hear, and talk as though they were actually there. In Canada, the Ontario Telemedicine Network (OTN) uses a dedicated IP network to link nearly 400 sites in rural northern Ontario to large urban teaching hospitals. They conduct more than 32,000 video consultations per year, and use the infrastructure to deliver educational broadcasts.

In 2008, the use of TelePresence made significant advancements. More than 40 global service providers have deployed Cisco TelePresence in their networks. Several providers, such as AT&T and British Telecom, have already started to grow their business by offering TelePresence services to their customers. Even the real estate and hospitality sector is buying in to this new business offering. Taj Hotels Resorts and Palaces have started to offer public TelePresence services between global locations on a pay-by-the-hour basis to customers. This offering is definitely a competitive advantage for Taj over other global luxury hotels.

Two Cisco vertical solutions provide the opportunity to change real estate and sports industries through Cisco Connected Real Estate and Cisco Connected Sports. The solutions incorporate a combination of Unified Communications, TelePresence, IP video surveillance, digital media, wireless, and other applications to transform the management and operations of buildings and sports complexes. The benefits associated with these solutions include lower operating costs, improved security, new and improved customer experiences, and new revenue opportunities. Pechanga Resort and Casino and the Watford Football Club are two organizations in this sector that are taking advantage of the power of IP video.

Overall, the use of IP video and visual networking are transforming business in many industries. Within Cisco, the application of video is evident within each functional line of business. From key delivery organizations such as product

development, marketing, and sales to corporate support organizations such as human resources and finance, IP video is improving communications, enabling knowledge transfer, growing revenue, and reducing costs, particularly through travel reduction.

## Visual Networking to Influence Public Opinion

Cisco began studying trends in visual networking earlier this year by sponsoring research for and application of a Visual Networking Index (VNI). A VNI Forecast was first introduced to provide projections for global IP network growth and usage. It is based on analysis from independent analysts' forecasts. You can read more about about VNI in Appendix B.

As part of this VNI focus, regular installments of a VNI Pulse are planned to provide quantitative views of network-based consumer behavior through direct data collection. The first Pulse study, which was released just before this book went to print, describes the influence of visual networking in the 2008 U.S. presidential campaign. Participants in the Cisco VNI Pulse study included more than 1800 registered U.S. voters, who identified themselves as Democrat, Republican, Independent, or undecided. Some of the key findings included the following:

- Traffic to popular online video websites increased fivefold in 2008 from 2004.
- The Internet was identified by 62 percent of respondents as a regular source of election information, surpassed only by television (82 percent).
- Online video was used by 30 percent of voters to follow election coverage, and 75 percent of these users thought that watching online video enabled them to follow the election news and events more closely.
- Online video users appear more engaged than non-online video users; 62 percent stated they follow the election closely, in comparison to only 37 percent of non-online video users who said they are not following the election closely.

The Internet and visual networking are playing a key role to provide voters with election information and news coverage. One need only browse the content posted on YouTube, Wikipedia, or various news sources to learn about the

campaigns, investigate issues, and form an opinion. And more than ever, citizens are using these tools to express their own opinions and have them heard.

## How Is This Book Organized?

Although this book is intended to be read cover to cover, it is organized to allow you to focus on only the content that is most relevant to you. Part I of the book, Chapters 1 to 3, provides an introduction to the topic and dscribes why video and quad-play technologies are playing such a crucial role in communications today. These chapters also describe how the workplace is changing into work moments. Part II, Chapters 4 to 9, covers the Cisco experience with visual networking, organized by business function: CxO, finance, marketing, engineering, human resources, and sales.

Part III, Chapters 10 to 13, covers the external customer experience with visual networking, from several vertical markets making the greatest use of video: education, financial services, healthcare, high tech, real estate and hospitality, and sports and entertainment. Part IV, Chapters 14 and 15, describes the many use cases of visual networking and demonstrates how the future of video will impact business and the environment. If you do intend to read all chapters, the order outlined in the book is an excellent sequence to follow.

## Chapter Summary

- **Chapter 1, "Quad-Play and the Curse of Interesting Times":** Business is evolving to enable employees to work differently and do more with less. The workplace is being altered by a combination of integrated voice, video, web, and mobility applications, also known as quad-play technologies. This chapter explores the key trends driving the need for change: virtualization, globalization, and consumer-led entry of applications.
- **Chapter 2, "The Way We Work":** Quad-play technologies enable employees to conduct business any time, from any location, using any device. They are transforming the traditional work environment and enabling employees to achieve better work/life balance. This chapter describes a real-life scenario that demonstrates their use, and the chapter describes the potential benefits from the use of quad-play technologies.

- **Chapter 3, "Beyond Workplaces: Video in Collaborative Workspaces":** As the workspace evolves, we will find all aspects of communication benefit from quad-play collaboration tools. This chapter discusses how "work" is no longer a location we go to, but the activity we engage in regardless of where we are. Work can exist anywhere collaboration is possible, which is nearly anywhere with access to a network.
- **Chapter 4, "Scaling the CxO":** Traditional forms of executive communication cannot keep pace in today's global business environment. IP video is the key to allowing the CxO to scale in this new world. The expected benefits to the CxO from IP video are scalability, consistent communication, and increased global collaboration.
- **Chapter 5, "Cisco Finance and Investor Relations: Transforming Processes, Partnerships, and Public Perception":** This chapter discusses how video is used with the finance and investor relations functions to improve internal and external working relationships, improve training and knowledge transfer, provide real-time access to information and subject matter experts, improve the Cisco public image, and reduce travel cost.
- **Chapter 6, "Cisco Marketing: Video Accelerates Communications, Collaboration, and Time to Market":** The marketing organization uses visual networking for both internal and external communications. This chapter demonstrates how IP video is used to improve communications and collaboration, to accelerate global go-to-market of new products and services, and to connect with customers in many new, high-impact ways.
- **Chapter 7, "Optimizing a Global Engineering Organization":** The Cisco Development Organization uses video to improve communications, knowledge transfer, and the product-development process. This chapter describes various use cases from engineering executives, technical leaders, and program and project managers.
- **Chapter 8, "Maximizing Your Human Resources Through IP Video":** This chapter concentrates on the increased productivity that IP video can add to the employment process: recruiting, ramping up new

hires, knowledge transfer, and change management. It also covers the benefits of IP video in a company's childcare efforts, and how it can help companies execute better during rough market fluctuations.

- **Chapter 9, "Save More, Make More: Increasing Sales Productivity with IP Video":** Enterprises should look to revenue generation and not just cost avoidance when measuring the ROI of IP video. This chapter explores benefits experienced by the sales function to drive both cost savings and top-line revenue growth from making the sales force more efficient, conducting product launches faster, and making subject matter experts available sooner.
- **Chapter 10, "Transforming Educational Paradigms with IP Video":** This chapter demonstrates how video is being used in education to generate increased value for students, administrators, and communities. With increased adoption of mobile video, we expect even greater innovation in meeting the need for anytime-anyplace instruction.
- **Chapter 11, "Financial Services and Video: Accelerating Revenue, Relationships, and Much More":** Financial services institutions tend to take a more conservative approach toward technology adoption (to ensure security and reliability before deployment). However, even these companies are looking at the potential of new technology to help them do business more effectively. This chapter discusses how video makes a measurable impact on collaboration, training and relationship building, new product rollout, customer service, and regulatory compliance.
- **Chapter 12, "The Doctor Will See You Now: Transforming Healthcare with Video":** Video solutions provide hospitals, medical groups, and even governments with improved access to support and expertise, and thus improve the delivery of healthcare. This chapter discusses how healthcare organizations are using video to build and extend medical expertise, improve staff communications, transform patient care, reduce the cost of care, and improve patient experience with new and innovative services.
- **Chapter 13, "The Influence of IP Video on Other Industries":** This chapter explores the use of video in the high-tech, real estate and hospitality, and sports and entertainment industries to improve

communications, reduce operating costs, and create competitive advantages. A cross-industry example to give back to the community is also shared.

- **Chapter 14, "Opportunities in the Era of Visual Networking":** This chapter examines how organizations may benefit when all things Web 2.0 are embedded into video to unleash the era of visual networking. The opportunities and applications for e-commerce, advertising, business-process improvements, and collaboration are extensive and varied. Besides businesses, other segments such as entertainment, education, and public communications also stand to benefit from visual networking applications.
- **Chapter 15, "Collaboration Like Never Before: To Make a Difference":** When combined with other collaboration and conferencing tools, IP video empowers organizations to address the environmental challenges stemming from climate change. This chapter discusses how the use of these technologies can improve remote collaboration and productivity, leading to several benefits that protect the environment.
- **Appendix A, "How Cisco Uses Streaming Video for Worldwide Corporate Events and Training."**
- **Appendix B, "Cisco Visual Networking Index: Forecast and Methodology, 2007–2012."**

CHAPTER 12

# The Doctor Will See You Now: Transforming Healthcare with Video

## Executive Summary

Today, video solutions are providing hospitals, medical groups, and even governments with improved access to support and expertise, and helping to ensure that patients receive timely, effective, and safe delivery of care.

In this chapter, you will see how healthcare organizations are using video to

- Build and extend medical expertise
- Improve staff communications and collaboration
- Transform patient care
- Lower the cost of care
- Improve patient experience with new, innovative services

While healthcare is as much a critical public service as police and fire departments, it is also very much a business. Considerations such as staff productivity, communications, efficiency, and cost controls play as strong a role in day-to-day operations as the quality of patient care. At the same time, shortages of healthcare practitioners and aging populations have put significant strains on health systems worldwide. To address these issues, healthcare needs to transcend geographic and resource boundaries, and video has a key role to play in making that happen.

## The Technology Transforming Healthcare

Technology has always played a strong role in healthcare. From X-ray machines to pacemakers to MRIs, technology has helped to diagnose, treat, and heal. Its use has expanded from purely medical applications to supportive roles in staff communications, digitizing and storing of patient records, and the processing of pharmaceutical orders. A natural extension is for technology to be applied in ways that enable telemedicine treatment (sometimes called telehealth) and remote patient monitoring using audio and video capabilities, including videoconferencing, store-and-forward imaging, streaming video, and wireless video communications. From clinics to doctors' offices to hospital operating

rooms (see Figure 12-1), video is becoming as much a part of medical care as stethoscopes. Let's take a look at how we got to this point.

***Figure 12-1*** *Physician Using Video Consultation During a Surgical Procedure*

The earliest recorded use of telemedicine was a 1950s Nebraska project using closed-circuit television to provide mental health services from a university medical center to a state hospital 100 miles (160 km) away. Then, in the early 1960s, the NASA space flight telemedicine program began so that medical personnel on the ground could monitor astronauts' biomedical responses to space flight.

These elaborate deployments are, of course, unique. Because of the expense of equipment and lack of available high bandwidth for video, it is really only within the past 15 years that telemedicine has become more widely available. The most common method for remote clinical diagnosis uses desktop, room, and portable videoconferencing units. Video telemedicine has been practiced most often in underserved rural areas or in situations where patient transport poses a hazard. In the case of the former, a rural doctor or nurse typically consults with a specialist physician based at a metropolitan or university hospital. Using videoconferencing technology and specially adapted medical tools, the remote

doctor can see the patient, talk with the local healthcare practitioner, hear a heartbeat through a remote stethoscope, see images from ear/nose/throat exams, or examine skin conditions. Although enormously beneficial, this application has typically required leased T1 telephone or ISDN lines, which can be prohibitively expensive. In addition, telemedicine services were not always covered by patient insurance plans, further limiting early adoption. However, the Balanced Budget Act of 1997 and Benefits Improvement Act of 2000 finally made telemedicine eligible for coverage by Medicare payments, enabling many citizens in rural areas to receive video medical treatments of all types.

Because of a number of issues (legal, cost, patient/physician acceptance of the technology, payment issues), the most common use of video telemedicine has actually been to provide healthcare to prison populations. Prisoners have a legal right to medical treatment, but the cost and danger of transporting them to a medical facility is extremely high, because at least two guards and possibly an ambulance are required for transport. However, the high risk factor more than cost-justified using telemedicine in many states and paved the way for its use by other organizations.

Now that we have a better appreciation for video's past role in healthcare, let's take a look at how it is being used today. The first step toward the use of video in many medical environments has been to accommodate for digital video imaging (sometimes known as picture archiving and communications system, or PACS) and record storage. This typically requires a network and bandwidth upgrade to support the volume of information being transferred and stored. The offshoot for organizations who have done this is that they can now support full motion video for telemedicine and related applications. These new capabilities have a significant impact on the quality of patient care, allow staff to collaborate and communicate differently, help organizations to build and extend expertise, offer new services to patients and their families, and lower the cost of care. The ten case studies that follow provide real-world examples of the many innovative uses for video in healthcare today. Let's start with two that impact the medical staff directly.

## Building Expertise and Boosting Communication: Alabama Department of Rehabilitation Services

The Alabama Department of Rehabilitation Services is a state agency that offers medical, educational, vocational, and independent-living services to children and adults with disabilities. The department has two dozen locations throughout Alabama, and rehabilitation professionals need to attend meetings, conferences, and training sessions to maintain certifications and stay up-to-date on best practices. However, limited time and budget made it difficult for staff to attend every mandatory meeting in person. They had looked to the state's existing ISDN-based videoconferencing system as an option for certain meetings, but at a cost of $80,000 per year to run, it was too expensive to be a practical alternative. They needed a more cost-effective way to enhance the team's collaboration and educational access. In the end, they decided to migrate the state's existing ISDN-based system to one that was IP based. The department was pleasantly surprised to find that the new solution cost 90 percent less than maintaining the existing one, which allowed for the addition of new sites. Director Buck Jordan addressed their experience:

> We're spending approximately $58,000 total during this first year and already have more than 10 of our sites running. With Cisco technology, we can run data and video across the same circuit, so we are saving a lot of money.

Their solution features both desktop and room videoconferencing systems and accommodates both point-to-point and multipoint calls. Weekly staff meetings are now conducted via videoconferencing, saving numerous hours of travel time and thousands of dollars in phone-conference call charges. The staff is also able to meet federal mandates to achieve the highest degree and certification possible by participating from their offices in e-learning courses from colleges and universities instead of having to travel.

## Improving Employee Communications and Collaboration: Niagara Health

The Niagara Health System (NHS) is Ontario, Canada's largest multisite hospital group, consisting of 6 hospitals and an ambulatory care center serving 434,000 residents across 12 municipalities. The NHS has approximately 4200 employees, including 1800 nurses and 650 physicians. Care provided is wide ranging, and includes approximately 186,000 patient visits annually at the emergency departments and urgent care centers, and more than 184,000 ambulatory clinic and community program visits.

A recognized leader in the healthcare industry, NHS needed a way to enhance employee communications across its seven, geographically dispersed sites. The NHS is also dedicated to the continuous improvement of its patient services and was looking for innovative technology solutions that would enable the organization to meet this goal while achieving operational cost savings. After deploying a converged voice, video, data, and wireless network, they were able to connect in-house and remote staff to one another, strengthening communication and enabling higher-quality patient care. Clinical staff are now taking advantage of new videoconferencing capabilities to collaborate about patient case loads, share their expertise, and participate in certification training without having to travel.

These two examples clearly illustrate how video can help healthcare practitioners build and maintain certifications, communicate more efficiently, collaborate more effectively, and enhance many other day-to-day activities.

## Extending Expertise While Providing Improved Patient Care

As noted previously, there is a shortage of physicians of all types in many parts of the world, particularly in rural and remote areas. The next six examples demonstrate how video, and now TelePresence, is being used to extend medical expertise and services across town, across countries, and around the globe (everything from rounds to regular checkups to lifesaving to critical care).

## Robots Enable Physicians to Be in Two Places at One Time

UCLA and Johns Hopkins are world-renowned medical facilities; they stay that way in part because they focus on using innovative approaches to treatment. In the past few years, both organizations have begun to use remote presence robots to improve patient care. With systems from a company called InTouch Technologies, doctors can now project themselves to another location via remote-controlled mobile robots, which enable them to move, see, hear, and talk as though they were actually there (see Figure 12-2).


***Figure 12-2*** *InTouch Remote Presence Robot Enables Doctor and Nurse to Discuss Patient Case*

The 5-foot, 4-inch robots feature a flat-screen computer monitor and a two-way audio/video feed. They are guided by a physician using a joystick from a computer console in another location, such as an office, clinic, another hospital, or even home. The robot enables physicians to "beam in" to the hospital, visit with patients, and consult with colleagues and staff; the physicians can move, see, hear, and talk as though they were actually there. The screen rotates 340 degrees and pivots up and down, enabling the physician to see and hear everything going on

around the robot, and to check injuries and monitor equipment readouts. The robot is not meant to replace important daily interaction between patients and physicians, but it does serve as an extension to traditional patient-physician interaction, improving communication and increasing patient (and family) satisfaction. The robots provide the organizations with a wide range of benefits, including the following:

- **Providing consistent, high-quality services more effectively to a greater number of both patients and staff**: When travel time is reduced between all the locations they serve, physicians can be more available for consultations.
- **Extending healthcare professionals' presence to anywhere they might be needed at the right times**: For example, a specialist might not always be available onsite when a patient needs a procedure, dressing change, or emergency surgery, but a specialist can be available via video.
- **Making expert consultation available during off hours**: Many specialists are generally available on an on-call basis during overnight shifts. Hospital staff can typically access them only by phone for consultations, requiring the specialist to rely on verbal descriptions to make a diagnosis. The robots allow specialists to go into the patient room directly as if they were there and examine the patient for themselves.
- **Increasing the frequency of patient contact**: Today, specialists are onsite only about 40 percent of the time. However, the efficiency of the robots enables physicians to conduct "telerounds," adding another round of patient visits per day. When specialists are "available," particularly in wards such as the ICU, the rates of morbidity and mortality, length of stay, and cost of care all decrease.
- **Extending expertise for training and supervisory purposes**: Physicians can conduct training and supervise medical student procedures even from remote locations.

Survey results from physicians who have used the robots indicate that

- 96 percent said the technology allows them to advance or improve patient care and learn more about their patient's condition.

- 88 percent said the robots save time, increasing physicians' overall efficiency.
- Three out of four said the systems allow them to accelerate the time of patient discharge.

## Bringing Life-Saving, Specialty Care to Rural Regions: Ontario Telemedicine Network

The Ontario Telemedicine Network (OTN) in Ontario, Canada is another excellent example of both extending medical expertise. In this case, OTN extends medical care to an underserved rural population using video, and the technology helps to improve the speed of care in critical, life-or-death situations.

The northern part of the province is physically the size of Texas and California combined, but its population numbers just a few million. Consequently, there is a shortage of specialists throughout most of the province. In response, public and private sector partners joined together in 1998 to establish what is now known as the Ontario Telemedicine Network, an extensive telehealth service designed to provide remote consultations, medical education, and patient support to remote hospitals and clinics. Two other telemedicine networks also came about during this same period, but all three were challenged by technology incompatibility issues. In 2006, the three merged into a single secure platform known as Ontario Telemedicine Network. OTN uses a private IP network (dedicated to healthcare applications) to link nearly 400 sites in the north to large urban teaching hospitals. They currently facilitate more than 32,000 video consultations per year (see Figure 12-3), and run an extensive number of educational broadcasts using the same technology. A government grant allows them to directly pay consulting physicians, bypassing the typical billing problems for remote telehealth consultations.

***Figure 12-3*** *Dr. Soucie Uses the OTN to Consult with a Nurse and Patient from His Office (courtesy of Ontario Telemedicine Network)*

Although patients can access more than 30 specialties, perhaps the most dramatic application of the power of the application is within the neurology and cardiology practices. Because winter in Canada features lots of snow and ice, a trip from more rural areas to see a specialist in Toronto can be not only a long trip, but a potentially dangerous one. The treacherous roads also mean that a patient who needs rapid treatment, such as in the case of a heart attack or stroke, might not be able to reach a specialist in time before the damage becomes irreparable. The telemedicine application enables patients to go instead to their local hospital, connect via video to a specialist in a major city, and be diagnosed at the earliest onset of symptoms when life-saving treatment can still be administered. Some of the physicians affiliated with OTN are also equipped with virtual private networked laptops, enabling them to do consulting from their personal office or even from home (see Figure 12-4). Of patients who have used OTN's capabilities, 96 percent reported that they were satisfied or very satisfied, and would use it again if appropriate. It has significantly reduced the cost of delivering service and transporting patients by $8 million, and has reduced hospitalizations among people in the region.

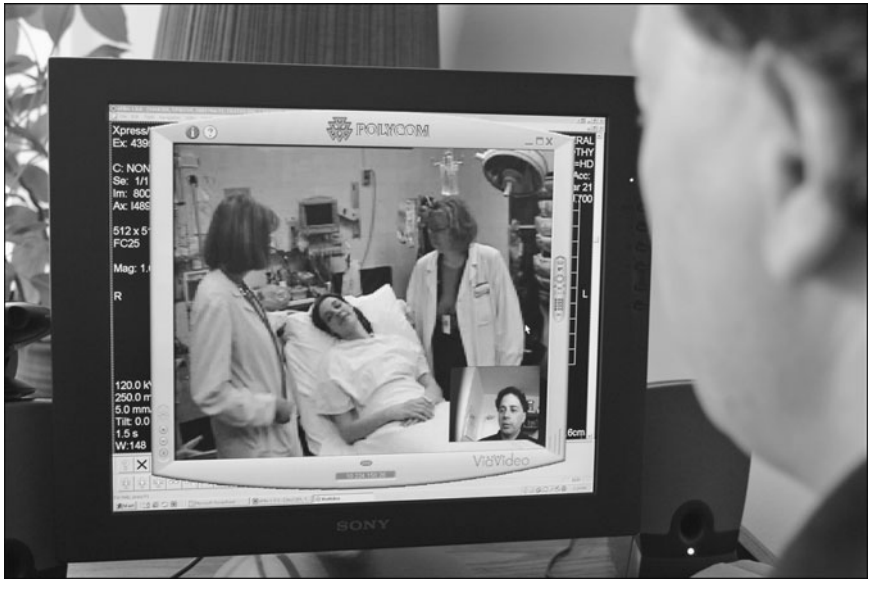



***Figure 12-4*** *Doctor Frank Silver Uses a Networked Laptop and the OTN to Conduct a Video Consultation from His Home Office (courtesy OTN)*

## Video Brings Critical Care to the Littlest Patients: Adena Health System

Adena Health System, a healthcare organization that serves the residents of a 10-county region in southern Ohio, deployed a Cisco networked video solution that included high-definition videoconferencing and clinical imaging. With this solution in place, Adena Health System can now link its main facility, Adena Regional Medical Center, to Nationwide Children's Hospital in Columbus as part of an ongoing initiative to provide a higher level of care for patients, particularly expert neonatal care.

Adena Health System's telemedicine initiative began in 2006 when it connected its neonatal department with Nationwide Children's Hospital's neonatal ICU via video. Adena Regional Medical Center provides outstanding care for mothers and newborns, but it has limited access neonatal critical-care specialists. For that reason, Adena doctors typically had little choice but to transfer any newborn that might need critical care to Nationwide Children's Hospital, located 70 miles (113 km) north. Adena typically transferred more newborns to Children's Hospital than any other provider outside Columbus. These transfers placed significant emotional and financial strain on families and newborn patients, and often separated newborns from still-recovering mothers.

Using video, specialists at Nationwide Children's Hospital can evaluate newborns with their own eyes. Therefore, they can make more accurate diagnoses, share test results and imaging films, and fully participate in treatment as if they were standing in the same room. For families, it means advanced care close to home and fewer newborns that need to be transferred. In just its first year of operation, the project helped cut the number of patients transferred in half. For those who are transferred, the medical staff at the receiving end are much better prepared to provide treatment; they have truly "seen" the child before he or she arrives at their door (see Figure 12-5). Families of transferred children can also use the videoconferencing system to see their little ones and keep up-to-date on their care without having to make a trip to do so.

***Figure 12-5*** *Doctors in Adena Health System Use High-Definition Video to Provide Neonatal Care*

As Adena Health System focuses on enhancing patient care, delivering cost savings, and increasing productivity, they are exploring other advanced uses of video. One area being explored is virtual classrooms in the campus near the medical center. The campus will comprise a four-year nursing school in collaboration with Wright State University in Dayton, Ohio University in Athens, and other Adena educational partners. In these virtual classrooms, physicians from anywhere in the world will use a telemedicine application to teach remote students. The new facility will also support video recording and broadcasting.

The impact of Adena's success with this project is already being felt on a broader scale. The Federal Communications Commission recently awarded a $14 million grant to build a fiber-optic network connecting healthcare providers across 15 counties in southern Ohio. Based on their own success, Adena was chosen as one of the organizations that will oversee the new project.

## Beyond Videoconferencing: TelePresence Becomes the Next Step in Telemedicine in Scotland and New Zealand

In 2008, the Scottish Centre for Telehealth (SCT) and the National Health Service began the world's first trial of Cisco HealthPresence, a new patient-care delivery concept based on Cisco TelePresence technology. SCT develops and disseminates best practices, standards, protocols, and processes that support telehealth solutions. It supports a range of projects that contribute toward preventive care, improved standards, and speed of care.

Cisco HealthPresence combines life-size high-definition video, rich audio, and call-center technology to create a virtual face-to-face experience for patients and caregivers who are remote from each other (see Figure 12-6). The HealthPresence platform also interfaces with medical diagnostic equipment, such as stethoscopes and otoscopes, and monitors that can measure weight, blood pressure, temperature, pulse rate, and lung function to capture the physiological condition of the patient. An attendant is available to operate the medical devices on behalf of the caregiver/patient and to maintain the technology.


***Figure 12-6*** *Cisco HealthPresence Enables Patients and Medical Staff to Meet Virtually "Face to Face"*

The trial is designed to test the effectiveness of HealthPresence and patient and caregiver satisfaction. The goal is to improve the quality of what had previously been telephone-only advice and triage. It also brings healthcare services to remote and rural areas, where recruitment and retention of medical personnel is proving increasingly difficult, and helps extend healthcare beyond traditional doctors' office hours. Clinicians believe that being able to see patients and have all of their physiological parameters at the same time will improve patient care. Early reaction has been very positive, with physicians citing its ease of use and simple setup.

Gordon Peterkin, director of the Scottish Centre for Telehealth, spoke of his experience:

> In our efforts to provide better patient care and utilize our medical staff to the full, solutions such as HealthPresence enable us to offer convenience for patients and service efficiency for our doctors. We

> look forward to drawing upon the results from this trial to optimize our regional and national healthcare delivery resources.

Building upon the trial in Scotland, New Zealand's West Coast District Health Board (DHB) announced in July 2008 that it would begin the first global trial of Cisco HealthPresence between two different organizations: Buller Health, in the town of Westport; and Grey Base Hospital, about 60 miles (97 km) away. This trial will help enable medical providers in two remote locations to better scale resources, collaborate on cases, and provide patients with more convenient access to the medical expertise of a multispecialty team.

DHB provides patient care to more than 32,000 people throughout some of the most remote areas of New Zealand. Cisco HealthPresence enables medical professionals to break down the distance barrier and provide direct support to these areas. Some patients can now be assessed by specialists without travel, reducing patient transfers and related costs. Specialists also benefit. Using the technology allows them to see more patients than they previously could, because they do not need to spend much time traveling to and from remote locations. It will also make medical services more sustainable and resilient to fluctuations in workforce availability and patient demand.

## Improving Healthcare and Quality of Life: Afghanistan's Telemedicine Project

In 2007, Roshan, the leading telecom operator in Afghanistan, launched a first-of-its-kind telemedicine solution to expand healthcare access and delivery across the country. Using broadband technology, wireless video consultation, and digital image transfer, the telemedicine project is providing hospitals with real-time access to specialist diagnosis, treatment, and training expertise from abroad. Broadband technology provides high-speed access for the transfer of medical imaging, video, data, and voice. Applications include the capability to send X-rays, ultrasound and CT scans for evaluation in real time, and the technology enables e-learning and training through video consultation.

Even though the service is new, the expectation is that there will be an average of 10 to 15 videoconferences between hospitals per month, with the numbers increasing over time. Capabilities will be gradually expanded to address different

services and procedures, including evaluation of tissue samples and the online performance of medical and surgical procedures.

Amirzai Sangin, the minister of communications and information technology, offered the following:

> Our government is striving to improve the quality of life of our people, and providing quality healthcare is one of our top priorities. Telemedicine is the perfect marriage of the speed, convenience, and cost-effectiveness of wireless and broadband technology. This innovative use of technology and telecommunications to enhance healthcare delivery will help underpin our efforts to meet the nation's other development challenges.

These case studies provide great examples of how video extends medical expertise whenever and to wherever it is needed, and in a wide range of applications. In every case, it benefits the medical staff and patients alike; it improves the speed, depth, and quality of care while lowering costs, travel times and stress involved. Patient acceptance and satisfaction is quite high, and with high-speed bandwidth becoming more and more ubiquitous, it becomes hard to imagine a place where video could not be used to provide medical care in a similar way.

The last two examples in this chapter address innovative uses of video in healthcare environments, where organizations chose to think differently about their basic operating processes and chose to invest in video in ways that would help them scale, improve existing patient services or provide new ones, and in both cases, improve their own image with the local area that they serve.

## Connecting Clinicians and Patients with Innovative Services: California's Healthcare Interpretive Network

Language barriers are of particular concern in healthcare, where life-and-death decisions are made and medical regimens are agreed on through discussions between healthcare professionals and patients. Without good communication, patients' knowledge of their disease, treatment advice, and complications are compromised, while doctors struggle to understand symptoms or recommend treatment. This is why interpretive services are so critical.

In California, 40 percent of its residents now speak a language other than English. In response to this growing dynamic within the state, the Health Care Interpreter Network (HCIN) of Northern California was created in 2006. The HCIN is a system of shared remote interpreter services operated by seven Northern California public hospitals. Using an IP-based call center to provide access to trained interpreter services, participating providers use interpreters at their own hospitals or at other hospitals through videoconferencing and other telecommunications technologies. Figure 12-7 shows an example of the type of portable equipment that is brought into the patient's room to connect the healthcare provider with an interpreter. Calls are routed by several criteria including the hospital that initiated the call, special interpreter skills requested (such as particular language), special medical expertise required, or by male or female interpreter. These technologies enable member hospitals to eliminate time, distance, and language as barriers to effective communication between clinicians and patients. This program offers hospital staff rapid access to trained interpreters among all participating providers, and interpreters no longer have to travel between the facilities they support. Manual searches for an interpreter used to take up to an hour, but responses to a call now average just 22 seconds, and no response takes longer than 3 minutes. The service is also available 24 hours a day, and emergency calls can be "bumped" to the head of the call queue if necessary.

***Figure 12-7*** *Patients and Physicians Can Talk with One of Many Skilled Interpreters Using Portable, Rollabout Video Carts*

The interpreter network currently handles approximately 3500 video-conference and phone calls per month. Before this solution was available, 42 percent of hospital staff said that difficulties getting an interpreter posed a serious problem in the provision of care, and 79 percent of physicians said patients lacked understanding of medications, preventive care, and self-care instructions because of a language barrier. Since implementation, fewer than 20 percent of providers reported that they perceive confusion over procedures as the result of a language barrier. Every staff member surveyed found that HCIN was convenient, made them more productive, simplified patient communications, and improved the quality of patient care. There are now plans to expand the service to other languages, including American sign language.

HCIN hospitals are not alone in this success. Alameda County Medical Center and San Francisco General Hospital have implemented a similar video medical interpretation project of their own. Despite having a large in-house staff, wait times for an in-person interpreter used to be as long as two hours. Using the video-based solution, a clinician instead rolls a portable video station into the room and places a video call to the call center, which transfers incoming requests to the appropriately skilled interpreter. With the solution in place, wait times have been drastically reduced, and patients are very happy. Post-visit surveys indicate that patients feel like they are seen faster. When patients were asked to rank video services on a scale of 1 to 3, with 3 being "completely satisfied," the average score was 2.9. Both Alameda and San Francisco General found that they could make better use of their interpreters, too. Because they no longer need to travel to see each patient in person, less time is spent on each request. In fact, the average request time has been reduced from 37 minutes to just 17 minutes. Further analysis showed that the solution saves approximately 14,500 hours per year, or the equivalent of 7 full-time interpreters at a cost of more than $400,000. With these savings, language services can also be provided to departments that did not have professional interpreters before.

In both of these examples, the cost savings from not having to rely on commercial interpreter services or hiring additional staff simply to keep up with demand is a significant benefit. Instead, the organizations in these examples have chosen to think differently about how they can use their resources more effectively *and* improve the quality of the patient experience at the same time. These results are particularly important to public hospitals because they have to demonstrate

commitment to patient services, good use of taxpayer dollars, and compliance with regulatory requirements such as equal access laws. Figure 12-8 shows video interpretation being conducted using sign language.

***Figure 12-8*** *Sign Language Interpretation Being Provided over Video*

## Innovation Improves Image and Patient Care: Arras Hospital

Arras Hospital in northern France has 1200 beds and 2000 staff, treating more than 100,000 patients each year. Back in 2001, however, its extreme difficulties in providing care and maintaining financial viability prompted its leadership team to undertake an ambitious project to renovate many of its facilities. As part of this renovation, Arras conducted a complete upgrade of its network infrastructure, moving to a converged network for data, voice, and video. Its primary video application was to support digital imaging (PACS), but expanded bandwidth and video capability enabled Arras to add three other important applications.

First, they added videoconferencing capability with neighboring hospitals in France to expand the pool of medical experts who could contribute to patient care on difficult cases (see Figure 12-9). They made their own systems and records available to these remote physicians to encourage collaboration.

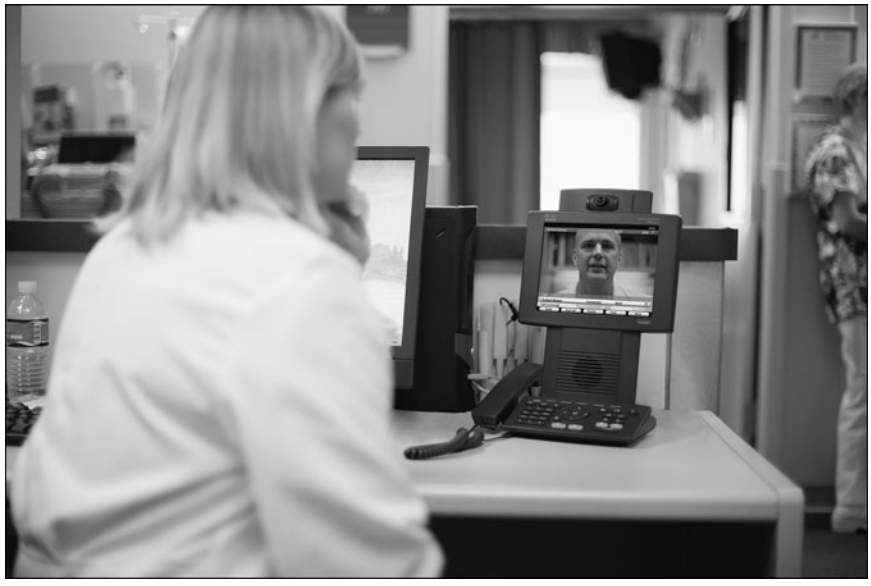


***Figure 12-9*** *Doctors Discuss a Patient's Case Using a Desktop Video Phone*

Second, they were able to add video surveillance to the hospital complex, with the goal of maintaining safety in certain patient wards, such as clinical psychiatry.

Third, in 2004, Arras began a pilot program in which mothers could monitor their babies in the neonatal ICU via video. The pilot was so successful that the hospital has begun expanding this capability to other patient units to enable those undergoing longer stays to maintain links to family, school, and work. Arras is also reaching beyond hospital boundaries to begin remote telemedicine projects with the regional jail system and with regional patients engaging in ongoing rehabilitation and chronic-care services from home.

Reaction to the new capabilities from patients, physicians, and the public has been overwhelmingly positive. Arras's innovative approach has even garnered them two unique endorsements from the French National Health Authority. They have also been asked to report their results in improved quality of patient care, improved physician access, and cost optimization in an upcoming parliamentary session.

## Summary

In nearly every part of the world today, telemedicine and telehealth initiatives are viable in terms of technology, bandwidth availability, cost, and patient/physician acceptance. Organizations that use video telemedicine applications are experiencing a number of significant benefits, including the following:

- Improved patient care, including better quality, greater speed, access to more medical expertise, and frequency of patient/physician contact
- Shorter hospital stays and reduced rates of hospitalization for patients
- Improved staff communications, collaboration, and productivity
- Improved training and certification opportunities
- Reduced cost of care
- Competitive advantage and improved organizational public image in a unique marketplace that has both public and governmental pressures

The success of these deployments in clinics and hospitals leads to the next logical step: their availability in a home setting. Doctors tend to try to send patients home as soon as possible because they tend to feel better and heal faster in an environment where they are most comfortable. Because consumers have HDTVs and broadband at home in ever-greater numbers, it is not much of a leap to adding a camera and being able to contact your medical provider from your living room. When it is as simple as turning on your TV, it gives a whole new meaning to "the doctor will see you...*now*."

# Numerics



# A



# B



# C

# D



# E

# F



# G



# H

# J-K



# L



# M



# N

## O



## P



## Q



## R



## S

# T

# X-Y-Z