

The Cisco Medical-Grade Network: Transforming Healthcare



The healthcare industry is undergoing a transformation. Faced with mounting pressures to reduce costs while improving the overall quality of care, healthcare organizations worldwide are increasingly turning to information technology to help address business and technical challenges.

In order to make prolific changes in the healthcare delivery system, technology must be utilized to augment the current caregiver model. By creating a connected healthcare ecosystem—an integrated and interoperable system of patients, healthcare providers, financiers, and support organizations—information can be exchanged more effectively among all key stakeholders.

The Cisco® Medical-Grade Network framework is a network design optimized for the healthcare environment, providing the foundation required to create a connected healthcare ecosystem. By providing an industry-specific framework that maps clinical and business needs to technology solutions, the Cisco Medical-Grade Network meets healthcare's unique needs for interoperability, security, availability, productivity, and flexibility.

Compelling Business Challenges

A number of business challenges continue to plague the healthcare industry, most notably rising costs and a decreasing workforce to service an increasing patient load. Meeting these challenges also requires a shift to a new outpatient, preventive, and patient-centric care model.

Minimizing Costs: Controlling costs is a primary concern for healthcare providers, insurance companies (in the United States), and those who pay for healthcare—including employers, patients, governments, and taxpayers. In the United States, a May 2006 report from the Centers for Medicare and Medicaid Services (CMS) estimates that total health expenditures will reach \$1.9 trillion in 2006 and are projected to rise to more than \$2.4 trillion in 2015. As a percentage of the U.S. Gross Domestic Product (GDP), healthcare costs have risen from 7.2 percent of GDP in 1965 to more than 16 percent of GDP today. These costs are projected to be 20 percent of GDP in just ten years.

Rising healthcare costs are indeed a global concern, with double-digit increases seen in several countries in the European Union and Canada. According to the Organization for Economic Cooperation and Development, healthcare spending accounted for 10.9 percent of the GDP in Switzerland, 10.7 percent in Germany, 9.5 percent in France, and 9.7 percent in Canada.

Chronic conditions are also a significant cost factor, and technology can play a role in preventing acute conditions from becoming chronic. According to the Centers for Disease Control and Prevention (CDC), chronic conditions account for 75 percent of all healthcare costs. In the United States, uninsured or underinsured patients who have acute conditions usually lack basic healthcare access, and without routine, preventive care, their conditions can become chronic. CDC also estimates that by 2013, 56 million people in the United States (nearly 28 percent of the workforce) will not have insurance.

Another factor driving up cost is unnecessary spending. According to a study published in 2003 in the *Annals of Internal Medicine*, 30 percent of healthcare expenditures are unnecessary and wasteful, largely the result of poor healthcare practices, such as redundant testing, unnecessary hospital admissions, medical errors, and manual paperwork. In 2004, Harvard Medical School researchers reported that the United States spends \$399 billion per year on healthcare bureaucracy—essentially the administrative costs of insurers, hospitals, physicians, nursing homes, and other health-related institutions.

Fewer Healthcare Providers, More Patients: Healthcare as a whole is challenged with a shrinking workforce and an increasing number of patients. The following statistics are alarming:

- The U.S. Department of Health and Human Services (HHS) reports alarming numbers on the nursing shortage, with no short-term relief in sight. The nursing shortage in 2000 was pegged at 6 percent, but by 2010 this shortage will double to 12 percent. By 2015, the shortage is expected to triple to 20 percent and to continue growing to 29 percent by 2020.
- While the U.S. population has steadily increased, there has been no increase in medical school graduates. In a November 2006 update of the U.S. Census Population Distribution in 2005, the U.S. population stood at 296.4 million, an increase of five percent in just five years. The U.S. Census predicts that the U.S. population will increase to 392 million by 2050—a number nearly fifty percent larger than the population number from 1995.

To offset the widening gap between the number of patients and the number of healthcare workers, healthcare organizations must increase their productivity.

New Care Model: To improve healthcare outcomes while decreasing costs, an increased emphasis is being placed on outpatient and preventive care. A significant benefit of this new care model is the increased focus on collaboration among healthcare providers. By using advanced communications technologies, new synergies among healthcare providers can be created and the subsequent treatment modalities can be improved.

The new care model is also patient-centric. Because patients are assuming an increasing amount of financial responsibility for their personal healthcare, they view themselves as healthcare consumers. Through Internet usage and other technology mediums, they are educating themselves and, consequently, demanding higher quality services. They approach healthcare as informed participants, aware of treatment protocols and alternatives.

In addition to educating themselves about medical treatments and practices, patients want to be able to access information about their own healthcare and healthcare providers. The accessibility and transparency of this information ultimately influences both provider selection and retention. To increase patients' satisfaction with healthcare providers and insurance plans, many healthcare organizations have initiatives underway to provide easy access to this information.

The Cisco Medical-Grade Network— Providing a Foundation for a Connected Healthcare Ecosystem

Unlike the healthcare environment of several decades ago, where a patient's various illnesses were treated by a single physician, today's patient and their medical and clinical information are seen and shared by many healthcare entities. To help power all parts of this new healthcare world, a **connected healthcare ecosystem** is needed—where networked resources of data, information, knowledge, and processes are all parts of the connected healthcare world.

The first step for many healthcare organizations is to take advantage of technology to create a platform where information can be collected and exchanged electronically. The Cisco Medical-Grade Network creates the foundation technology from which this information can be disseminated within the hospital or healthcare system. By interconnecting independent healthcare entities that are now technology-enabled by the Cisco Medical-Grade Network, Cisco supports the transformation of healthcare with the connected healthcare ecosystem.

The Cisco Medical-Grade Network helps create collaborative relationships among all members of the connected healthcare ecosystem, enabling a connected healthcare community through interoperable processes, technology, and people to provide 'anywhere, anytime' information. While the benefits of connectivity may be different

for each segment of the health community, the benefits to the patient are the same: the delivery of safe, affordable, and accessible healthcare. In the end, it is simply about connecting people to enable access to critical health information anywhere and at any time.

The Cisco Medical-Grade Network provides an optimized framework for the healthcare industry meeting healthcare's unique needs for interoperability, security, availability, productivity and flexibility. Recognizing that every healthcare institution has different needs—whether it is a hospital, a clinic, or an academic facility—the Cisco Medical-Grade Network provides a framework that defines network strategies and policies that are purpose-built for each environment. By building networks within the organization that meet the unique security, availability, and flexibility needs, the stage has been set to expand the organization's reach into the connected healthcare ecosystem.



Figure 1: Interoperable Healthcare Ecosystem

Cisco Medical-Grade Network's end-to-end framework is built specifically for the healthcare industry, providing integration and interoperability at each functional area to optimize interactions among healthcare participants, processes, applications, and hardware components. Healthcare applications are generally complex and many large healthcare systems boast more than 300 different applications. With the Cisco Medical-Grade Network, diverse business and clinical communications are facilitated and integrated across the continuum of care.

To meet the unique security requirements of the healthcare environment, the Cisco Medical-Grade Network also offers identity and policy-based privacy and security from inside the network to beyond the organizational walls. The network facilitates healthcare industry requirements to securely store large amounts of data for extended time periods.

In the acute care environment, 24/7 availability is required. The Cisco Medical-Grade Network's high-availability design effortlessly supports the requirements of today's health organizations through the convergence of data, voice, video, and imaging. Connecting people and information in real time, the Cisco Medical-Grade Network enables healthcare providers, patients, and administrators to access the information through a converged network, enabling access when and where they need it.

In addition, the Cisco Medical-Grade Network augments the professional skills, memory, and performance of healthcare providers. By automating workflow and collaboration, clinical and business processes are optimized. To further maximize productivity, the Cisco Medical-Grade Network facilitates application mobility. As healthcare continues to demand a truly mobile workforce, where physicians, clinicians, students and other providers regularly come and go, the Cisco Medical-Grade Network supports the flexible needs of these healthcare providers, ensuring that they remain productive, regardless of their location.

The Cisco Medical-Grade Network architecture promotes strict adherence to required healthcare service levels, while reducing the network's operational expenses and the capital necessary to procure equipment. Recognizing that each healthcare setting has different service-level requirements, the Cisco Medical-Grade Network maps service needs to business and clinical requirements.

Inside the Cisco Medical-Grade Network— The Cisco Medical-Grade Network Layered Architecture

To meet today's healthcare needs, while laying the foundation for the clinical requirements of the future, the Cisco Medical-Grade Network is based on Cisco's modular Service-Oriented Network Architecture (SONA). By providing a flexible platform, SONA allows new applications, technologies, and/or equipment to be easily added to the network.

The Cisco Medical-Grade Network architecture comprises three layers: the Application Layer, Interactive Services Layer, and Networked Infrastructure Layer. (See Figure 2.) Each functional layer enables systemwide communications, enabling the system to operate efficiently and disseminate clinical and business information throughout the Healthcare System.

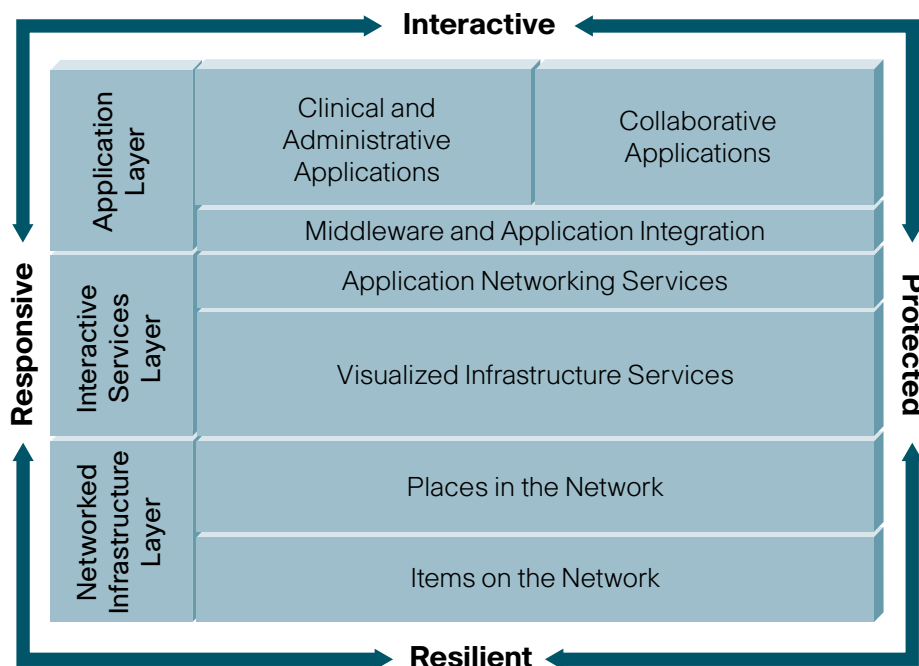


Figure 2: Cisco Medical-Grade Network Layered Architecture

Application Layer: The Application Layer is comprised of clinical, business, and collaborative applications, which work in tandem to maximize productivity while enabling scalable and secure communication and application integration. This layer typically includes the most commonly used applications, such as Electronic Medical Records (EMR) and Picture-Archiving Systems (PACs), as well as business administration functions such as registration, Enterprise Resource Planning (ERP), and billing.

Interactive Services Layer: The Interactive Services Layer provides rich, interactive services such as infrastructure services, heterogeneous services, centralized network-based services, storage services, security services, application delivery, and application-integration services. This layer provides much of the functionality required to provide accessibility, security, resiliency, and interoperability. Through virtualization, the Interactive Services Layer provides bottom-line value to the organization by improving network efficiency, reducing the number of devices that require support, and simplifying the management and integration of the network—all while meeting the necessary performance requirements for the Connected Healthcare Ecosystem.

Networked Infrastructure Layer: The Networked Infrastructure Layer is the foundation for converging data, voice, video, and imaging across the Connected Healthcare Ecosystem. This layer provides intelligent connectivity

services for networked elements. Through features and technologies such as quality of service, access control, admission control, and rate-limiting, the Networked Infrastructure Layer enables advanced service deployment.

Solving Today's Business Challenges, Building for the Future

To address the growing challenges of providing healthcare, all members of the healthcare system—including patients—must be part of the connected healthcare ecosystem. The Cisco Medical-Grade Network provides the foundation for this ecosystem: it defines the accepted technology and business standards for the healthcare industry in terms of interoperability, security, availability, productivity, and flexibility, while ultimately supporting the highest-quality care outcomes and maximizing operational efficiencies. And because it is built on SONA, the Cisco Medical-Grade Network enables the adoption of new technologies and addresses how to apply these technologies to help healthcare providers and healthcare organizations solve today's business and clinical issues while preparing for the future.

Find Out More

To view case studies from hospitals and clinics that have deployed the Cisco Medical-Grade Network and other Cisco healthcare solutions visit www.cisco.com/go/healthcare



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