

# Top Children’s Hospital Improves Patient Experience



Children’s Hospital Colorado achieved its goals for disaster recovery and physician collaboration with Cisco solutions.

EXECUTIVE SUMMARY	
<b>Customer Name:</b>	Children’s Hospital Colorado
<b>Industry:</b>	Healthcare
<b>Location:</b>	Aurora, Colorado
<b>Number of Employees:</b>	3675 Employees
<b>CHALLENGE</b>	
	<ul style="list-style-type: none"> <li>Expand into new locations with different area codes and make sure voice services remain available during disasters</li> <li>Simplify physician collaboration</li> <li>Provide excellent caller experience in critical healthcare environment</li> </ul>
<b>SOLUTION</b>	
	<ul style="list-style-type: none"> <li>Eliminated single point of failure throughout the unified communications infrastructure and implemented Session Initiation Protocol (SIP) trunking</li> <li>Helped enable physician collaboration on critical patient care decisions using Cisco TelePresence solution</li> <li>Efficiently routed calls by setting up approximately 75 contact center queues</li> </ul>
<b>RESULTS</b>	
	<ul style="list-style-type: none"> <li>Helped to improve patient safety by building redundant voice architecture</li> <li>Reduced travel requirements for physicians and patients with telemedicine</li> <li>Lowered cost of increasing patient access to high-quality care in remote areas</li> </ul>

## Challenge

A private, not-for-profit pediatric healthcare network, Children’s Hospital Colorado provides comprehensive pediatric care at its main campus in Aurora, Colorado and 16 regional locations. More than 1000 pediatric specialists and 3600 full-time employees care for children at all stages of growth.

Until 2007, Children’s Hospital Colorado operated from a single facility. By 2012, the hospital had expanded its Network of Care to 16 locations with more than 150 specialty clinics. “We’re working to improve access to healthcare by operating smaller regional clinics that are closer to patient’s homes for specialty care services and by introducing telemedicine,” says Andrew Blackmon, Director of Infrastructure and Technology Services for Children’s Hospital Colorado.

Improving access to healthcare would require bolstering the unified communications infrastructure and collaboration capabilities:

- Disaster recovery: “In healthcare, the communications system is the first point of contact with patients and their families and also a life safety system for critically ill patients,” says Blackmon. “To eliminate any single points of failure, the hospital’s Unified Communications team wanted to distribute the Cisco Unified Communications Manager cluster across two locations, giving each location its own SIP trunk connection to the service provider.”

- Helping enable distributed clinical teams to collaborate with an in-person experience, but without travel time and costs: The hospital's cancer and blood specialists, for example, work in three different clinics. When they traveled to a different clinic for team meetings, their clinics could not see patients for at least half a day. High-definition videoconferencing would avoid inconvenience to patients, loss of revenue, travel time, and costs.
- Providing an excellent caller experience: Children's Hospital Colorado has approximately 75 contact center queues, including appointment scheduling, food services, financial services, IT helpdesk, nurse triage lines, physician on-call paging, and a nurse advice line for after-hours calls. Approximately 450 clinicians and staff answer these calls. "We needed a contact center solution that could continue operating during disasters, scale as the hospital continues to grow, and intelligently route calls to enhance customer service," Blackmon says.

The impetus for change arrived in 2010, when Children's began constructing a new facility in Colorado Springs to provide outpatient services for patients with cardiology needs or cancer and blood disorders. Unless the hospital changed its voice architecture, the new facility would need several of its own Primary Rate Interface (PRI) lines because it resides in a different area code than the other facilities. And if these PRIs went down, parents of the young patients might not be able to reach a physician during health emergencies. "To avoid putting patient care at risk, we needed an ultra-reliable voice architecture that would bring Colorado Springs local phone numbers to our main locations in Denver and Aurora," Blackmon says. These locations have backup generators and an extended uninterruptable power supply not usually available in outpatient facilities.

"In healthcare, the communications system is the first point of contact with patients and their families and also a life safety system for critically ill patients. To eliminate any single points of failure, the hospital's Unified Communications team wanted to distribute the Cisco Unified Communications Manager cluster across two locations, giving each location its own SIP trunk connection to the service provider."

— Andrew Blackmon, Director of Infrastructure and Technology, Children's Hospital Colorado

## Solution

Colorado Children's Hospital achieved its goals for disaster recovery and enhanced collaboration by implementing a Cisco® Unified Communications solution with Cisco Unified Border Element (CUBE) for Session Initiation Protocol (SIP) trunking. As one of the first healthcare organizations in the United States to connect to the public switched telephone network (PSTN) using SIP trunking, the hospital decided to reduce risk by engaging Cisco Services to provide an onsite engineer for two weeks. "Our unified communications infrastructure is too critical to take chances or cut corners," says Blackmon. "Cisco Services has significant experience with SIP trunking and addressed our concerns about disaster recovery, E-911, T38 faxing, and quality of service in a SIP environment."

## Resilient Communications Services

To provide disaster recovery capabilities, the hospital implemented redundant Cisco Unified Communications Manager servers and CUBEs in two data centers, in Denver and Aurora. The CUBEs terminate the SIP trunks to the service provider. If the circuit in one data center fails, new inbound and outbound calls automatically failover to the other location's circuit.

The first facility to connect to the new architecture is the new 500-phone building in Colorado Springs, which opened in June 2012. Although the facility has a different area code than the main campus, it can still share the redundant SIP trunk architecture (see Technical Implementation). The Cisco Unified Communications infrastructure has “operated flawlessly,” says Blackmon. In 2013, the hospital will begin to port the 10,000 main campus phone numbers over to the SIP trunks.

### **Helping Enable Remote Collaboration with Cisco TelePresence Systems**

Clinicians and administrators in any location can now collaborate with an in-person experience using approximately 100 Cisco TelePresence® endpoints. Even the hospital’s young patients enjoy the Cisco TelePresence experience when they can interact with Santa face-to-face using Cisco Jabber™ Video for TelePresence on a wireless PC, brought to their rooms on a mobile cart during the holiday season.

### **Simplifying Customer Care with Intelligent Contact Center**

To help callers quickly reach the right department, the IT team set up more than 75 contact center queues using Cisco Unified Contact Center Express. When parents call their child’s pediatrician after hours, the physician’s answering service connects the caller to a nurse who can answer questions and give advice. “Nurses are in high demand, and Cisco Unified Contact Center Express helps us attract and retain top talent in any state by giving them the option to work from home,” Blackmon says. Nurses receive a Cisco softphone or Cisco Unified IP Phone, Cisco 800 Series Integrated Services Router (ISR), Business Internet circuit, and VPN connection.

### **Helping Enable Mobile Staff**

Approximately 1600 mobile clinicians and staff use Cisco Unified Wireless IP Phones 7925 to place and receive calls from any facility. This capability makes them easier to reach than if they had to walk to a desktop phone and check voicemail. The wireless phones are also integrated with the hospital’s two nurse call solutions (Intego and Rauland Responder5), which provide notifications when a patient presses a button to request assistance. Nurses can remain in direct contact with their patients even in intensive care units using their wireless IP phones. “Integrating our existing hospital nurse-call and patient-monitoring systems with Cisco Unified Communications enhances the clinician’s awareness of the patient’s conditions, helping to improve the quality of care,” Blackmon says.

“If one data center or SIP circuit goes down, new inbound and outbound calls failover to the other circuit and location nearly instantaneously, without any manual intervention. The SIP architecture provides far better disaster recovery capabilities than ISDN PRI circuits.”

— Andrew Blackmon, Director of Infrastructure and Technology, Children’s Hospital Colorado

## **Results**

### **Children’s Hospital Colorado Improved Patient Safety with Highly Reliable Communications Services**

The new voice architecture provides the foundation for a robust disaster recovery solution serving all Children’s Hospital Colorado locations. Blackmon estimates that the SIP-based disaster recovery solution lowered monthly telecommunications service charges by about half compared to adding redundant ISDN PRI connections to the secondary data center. “We would have chosen the SIP solution even if it had cost more, because as a healthcare provider, our primary objective is to make sure that patients and their parents can reach us and we can reach them, at all times,” he says.

## **Children's Hospital Colorado Increased Quality of Care with Telemedicine**

With Cisco TelePresence technology, clinicians can now collaborate with colleagues in other locations to discuss patient care and review images as if they were in the same room. For example, a partner hospital in Billings, Montana, which does not have a pediatric neurosurgeon, used to always transport any child with a head injury by helicopter to Children's Hospital Colorado. Now the attending physician can connect with a pediatric neurosurgeon at Children's to discuss the injury and make an informed decision about the need for transport. "We've reduced the number of emergency patient transfers from our partner hospital in Montana by 60 percent by using Cisco TelePresence for physician collaboration," says Blackmon. "This significantly lowers transportation costs, improves patient outcomes, and saves parents the anguish of a 12-hour drive to reach a specialist."

Clinicians also use Cisco TelePresence sessions for departmental meetings, avoiding an up to eight-hour round trip. Rather than closing clinics while they attend meetings, physicians can collaborate with their peers from their office, and then get right back to seeing patients.

## **Creating a Local Presence in New Communities**

With SIP trunking, Children's Hospital Colorado can now provide local phone numbers for clinics outside the Denver area code without the expense of purchasing a private branch exchange (PBX) system and local circuits. The service provider routes the calls over the SIP trunk to the hospital with 10-digit dialing, which allows the SIP trunk to terminate phone numbers from multiple area codes. "The main benefit of SIP and CUBE in our environment is its scalability, both in terms of call capacity and geographic coverage of LATAs [local access transport areas]," Blackmon says.

## **Next Steps**

The next step is to simplify the IT infrastructure by upgrading to the latest version of Cisco Unified Communications Manager. The new version supports Cisco TelePresence endpoints without requiring a separate gatekeeper and can also be implemented as a virtual server on the hospital's existing Cisco Unified Computing System™ (Cisco UCS®). The Cisco UCS operates both Microsoft Hyper-V and VMware and hosts Microsoft SQL Server, Oracle, and numerous other applications. "The Cisco UCS accelerates application performance because of its high RAM, considerable number of core processors, and 10 Gigabit Ethernet interconnects," Blackmon says. "Migrating SQL Server virtual machines from one physical server to another physical server used to take 30 minutes, and now takes less than 70 seconds on Cisco UCS."

## **Technical Implementation**

### **Disaster Recovery Architecture**

The traditional disaster recovery solution is bringing multiple backup ISDN PRI circuits to a secondary location to act as standby. To take this approach, Children's would have had to pay for enough backup circuits to support the total inbound and outbound call volume of all sites. And if the primary circuits or site went down, the IT department would need to ask the service provider to migrate the trunk group to the backup ISDN PRI circuits, a process that could take up to four hours.

"Using SIP trunking enables us to deliver the same block of DID [direct-inward-dial] numbers into both data centers," Blackmon says. "If one data center or SIP circuit goes down, new inbound and outbound calls failover to the other circuit and location nearly instantaneously, without any manual intervention. The SIP architecture provides far better disaster recovery capabilities than ISDN PRI circuits." What's more, because voice traffic arrives at the enterprise network over IP instead of traditional T1 circuits, Children's Hospital Colorado can take advantage of the redundancy already built into the campus data network.

“The network already includes redundant devices at the distribution and core layers, as well as fault-tolerant devices deployed end-to-end,” says Todd Zatorski, Manager of Network Infrastructure Services for Children’s Hospital Colorado. “Once the voice packet enters the network, it has many redundant paths to the end device, providing the high-availability needed in healthcare environments.”

For even more resiliency, Children’s implemented Cisco Unified Survivable Remote Site Telephony (SRST) on the new facility’s Cisco Integrated Services Router (ISR). In the unlikely event that both WAN links fail, Cisco Unified SRST automatically takes over the main functions of Cisco Unified Communications Manager, helping to make sure that employees and patients can continue to make and receive calls without interruption. When the WAN link is restored, phones automatically reconnect to Cisco Unified Communications Manager in the main enterprise data centers without effort from the IT team.

PRODUCT LIST
<b>Unified Communications</b>
<a href="#">Cisco Unified Communications Manager</a>
<a href="#">Cisco Unified Wireless IP Phones 7925 and 7921</a>
<a href="#">Cisco Unified Border Element (CUBE)</a>
<a href="#">Cisco Unified Survivable Remote Site Telephony</a>
<b>TelePresence</b>
<a href="#">Cisco TelePresence Integrator C Series</a>
<a href="#">Cisco TelePresence Video Communications Server</a>
<a href="#">Cisco Jabber Video for TelePresence</a>
<b>Customer Care</b>
<a href="#">Cisco Unified Contact Center Express</a>
<b>Data Center</b>
<a href="#">Cisco UCS B-Series Servers</a>
<a href="#">Cisco Nexus® 7000 Switches</a>
<b>Wireless</b>
Cisco Wireless Control System 5508
Cisco Aironet® Wireless Access Points 1200 and 3500 Series

### Support for Multiple Area Codes

The SIP trunking solution also helped enable Children’s Hospital Colorado to deliver Southern Colorado area code numbers into the Denver metro-area data centers, which is not possible with traditional ISDN PRI service. The IT team deployed a Cisco 3945E Integrated Service Router with CUBE for SIP trunking termination. The service provider can send multiple area codes through the SIP trunks to CUBE, which routes the calls to the Cisco Unified Communications Manager cluster. The alternative, using a traditional phone service delivered over PRI lines, would have required local voice gateways in Colorado Springs for all inbound and outbound calling. “Adding local voice gateways would have done nothing to advance our disaster recovery capabilities, and would have actually added an additional single point of failure into the building’s communications architecture,” Blackmon says.

“By routing inbound calls over one SIP trunk and outbound calls on the redundant SIP trunk, we can load balance across both circuits, increasing capacity compared to having one trunk sit idle until a failure occurs,” says Chris Maier-Walford, Unified Communications Engineer for Children’s Hospital Colorado.

### For More Information

To learn more about Cisco Collaboration, visit: <http://www.cisco.com/go/collaboration>.

To join conversations and share best practices about collaboration, visit: <http://www.cisco.com/go/joinconversation>.



---

**Americas Headquarters**  
Cisco Systems, Inc.  
San Jose, CA

**Asia Pacific Headquarters**  
Cisco Systems (USA) Pte. Ltd.  
Singapore

**Europe Headquarters**  
Cisco Systems International BV Amsterdam,  
The Netherlands

Cisco has more than 200 offices worldwide. Addresses, phone numbers, and fax numbers are listed on the Cisco Website at [www.cisco.com/go/offices](http://www.cisco.com/go/offices).

 Cisco and the Cisco logo are trademarks or registered trademarks of Cisco and/or its affiliates in the U.S. and other countries. To view a list of Cisco trademarks, go to this URL: [www.cisco.com/go/trademarks](http://www.cisco.com/go/trademarks). Third party trademarks mentioned are the property of their respective owners. The use of the word partner does not imply a partnership relationship between Cisco and any other company. (1110R)