CHAPTER 1

Cisco Service Ready Architecture for Schools Solution Overview

Executive Summary

Cisco is committed to the education environment and understands the varying complexities and business influences that impact the continual operation of critical educational network services. As the network becomes more crucial to the operation of the school district—due to the additional essential services that utilize it—it is important to create an architecture that addresses the growing complexities and criticality of the network. The Cisco Service Ready Architecture for Schools was developed as a guide to assist school leadership in planning for the evolution of the school network. It addresses the current network service requirements, such as safety and security, network availability, and mobility while building a foundation that is ready for the addition of future network services as they develop.

Introduction

The Cisco Service Ready Architecture for Schools is a network roadmap for school districts to utilize to enable 21st century education for students and teachers. This design is built by combining an understanding of the current and future school district network needs with the best technology available, while considering the technical and financial constraints faced by school districts.

Cisco's Service Ready Architecture for Schools is a well designed and validated network architecture that is flexible, adaptive and cost effective to support a wide range of education services. This architecture provides the ability to deliver all of the services required of an enhanced learning environment as well as the ability to collaborate with the other schools, district offices and entities beyond the district.

The Service Ready Architecture for Schools starts with a base network foundation consisting of a district office where a majority of the critical applications reside. Connected through a WAN transport of MetroEthernet, two examples of schools sites are provided. School site 1 consists of a smaller design from those schools with a lower student/teacher ratio. School site 2 is designed for a larger site. Each site can co-exist in a single school district or can be treated as separate modules. Having guidance for two separate sites provides flexibility, modularity and scalability as your school district migrates in size.

The district office and each school site contains the critical technologies, or services, required to achieve the base goals of safety, learning and efficiency. Tested techniques and guidance is provided so that a network IT staff can 'set it and forget it.'

The Service Ready Architecture for Schools takes the guesswork out of designing and configuring a school network. Cisco Certified Internet Engineers (CCIEs) have designed the network foundation, based on listening to the top concerns from superintendents across the globe, and provided guidance on

the key network technologies required to enable and solve those top concerns. The Service Ready Architecture for Schools was placed in a lab and tested using best practice techniques from over 20+ years of network design. The products, features, and configurations have been validated and can be utilized in your network.

Design Guide Structure

Cisco's Service Ready Architecture for schools is broken down into modular, interdependent chapters as shown in Table 1-1. This guide can be read as an extensive network design guide or in chapters to suit a particular technology needed.

Table 1-1 Cisco Service Ready Architecture for Schools Solution Overview

Chapter 3, "Network Foundation Design"	Chapter 8, "Digital Media and Video Surveillance Design"
Chapter 4, "Security Design"	Chapter 9, "Access Layer Security Design"
Chapter 5, "Wireless LAN Design"	Chapter 10, "School Site Design"
Chapter 6, "Context-Aware Services Design"	Chapter 11, "District Office Design"
Chapter 7, "Unified Communications Design"	

Supplement Documents

- *Schools Configuration Files Guide*—Example CLI Configurations from the validated design
- *Schools Netformix DesignXpert Tool*—Netformix Desing Expert Template for Schools SRA

The Service Ready Architecture for Schools network design is a comprehensive validated design based on proven techniques to take the guesswork out of establishing your school network. The techniques and guidance provided in the chapters can be used to design and to be deployed in your network easily with enough room for flexibility and growth. Leveraging the practices given in the Service Ready Architecture can establish critical technologies to enable and solve your top concerns in your school network: security, learning and efficiency.

Today's Education Environment

Schools are facing significant challenges that are creating opportunity and driving transformation of many aspects of the education environment. Technological innovation is not only applied to the learning process, but optimized for school operations to drive building and energy efficiencies, heighten the awareness of, and responsiveness to, safety and security concerns, and improve communications on and off campus.

Technology can provide a powerful platform for the educational needs of the 21st century.

Cisco delivers the best architectural framework—based on years of experience and cutting edge technology—to meet the requirements of the education environment. In forming an architectural framework for education, three key drivers are at the forefront of learning innovation:

- Student performance and assessment remains top of mind. Schools are being held accountable for the success and failure of their students, and their teachers while demands to provide equitable opportunities to all learners drives the need for a pervasive technology platform for access to the experts and resources needed. Governmental influence and accountability continues to drive schools to demonstrate that their students are successfully advancing
- Student expectations are changing and engaging kids is increasingly done best with technology. Social networking, online digital content, customized curriculum, and accessing resources worldwide are required. Schools are transforming into learning centers that support the development of basic skills while developing students that are globally aware, internationally competitive and masterful of 21st century skills and talent.
- Teacher Talent and Staff Development focused on leveraging our best expertise and providing optimal opportunities for students is also best supported with a flexible Communications and Collaboration platform. Developing teachers while enriching their own work environment with technology will lead to the innovative application of collaborative tools to students and their classrooms.
- With school budgets and funding sources tightly monitored, schools strive to improve operational efficiencies. When schools streamline operations and processes, they become more cost effective and create sustainable, on-going savings. Schools increasingly look to the network to support critical operational functionality such as Energy Monitoring and Management, Emergency Paging and Communications and Video Based Surveillance and Video Communications. Smart facilities management creates a school that is not only safer for students, a top issue for schools but also creates cost efficiencies and sustainable funding for many advanced technologies for the classroom.
- The ultimate end result of implementing the proper educational framework is to truly transform the current educational environment to one that promotes learning anywhere, anytime, regardless of the medium. Leveraging technology to eliminate barriers to accessibility is paramount to educators and school staff. Making information easy to access enables students to learn at their own pace and not be constrained to a single method of information delivery. Mechanisms that increase student performance can be realized through technology to assist in the development of 21st century skills. Some of the key initiatives to consider are:
- Smart and flexible learning environments—Classrooms are transforming into dynamic classrooms, which include digital content, on-line assessment, and pervasive access to rich media. Students are increasingly becoming the producers of content and controlling more of their own learning and the physical format of the classroom must change on-the-fly to facilitate the use of advanced technologies. Classroom walls are being “virtually” eliminated by the power of the network to allow for access to resources well beyond the physical school building, to be connected to national and global experts and resources.
- Technology-enabled learning—Information is being delivered in multiple formats, often combining methods of delivery to optimize the learning experience. Students are increasingly becoming the producers of content and a less formal, user-created content library is coming to the forefront in the education community. Students learn and share via video, photo-sharing, blogs, wikis, instant messaging, etc. Additionally, as the learning paradigm is shifting the role of the teacher is changing dramatically and students are developing a much sharper sense of self and audience.
- Social networking and on-line learning—Students are interfacing with each other and their educators more than ever. Another interesting trend is that students are publicly publishing their work more today, which drives a higher expectation for quality in the work they produce. Students who own their learning, retain their knowledge, and can apply it wherever and whenever it is needed.
- Convergence of information and communications—Web 2.0 initiatives continue to drive technology practices in the education community. Unified Communications is becoming more prevalent in schools and leverages the benefits of an IP-based platform to integrate data-rich information with communications, facilitating a higher level of responsiveness and engagement with the extended

community (the district, other schools, parents, etc.). This drive toward convergence has also enhanced the safety and security practices in schools where informed emergency response and threat avoidance are top of mind.

- Learning communities—Collaborative environments for both students and teachers are on the rise. Integrating technologies further enhance the experience by providing such utilities as interactive-video, on-demand video feeds, voice and Web collaboration, video to mobile devices, and TelePresence. The flexibility of integrating tasks and robust communications accelerates results for students, teachers, administrators and the community.
- One-to-one learning—New, inexpensive devices have provided teachers and students with an environment where everyone has access to a mobile computer, as well as digital content, educational software, and digital authoring tools.
- Connected real estate—Converging disparate building networks into a common IP backbone reduces many costly silos consuming hundreds of thousands of dollars each year. Intelligent and energy efficient buildings are a high priority for school districts as energy costs have risen and administrative budgets have been reduced. Connected Real Estate leverages the network to centralize operations and provide a platform that applies intelligence to basic building functions. Integrated video and communications are also a key element in promoting the safety and security of teachers and students. Policing building access or using RFID tagging for the protection of assets is quickly becoming a popular practice, as is the incorporation of IP video surveillance systems and emergency response technologies that are integrated to the entire district's network and the public safety community.
- Mobility—One of the largest movements in the education community is the pursuit of anywhere, anytime, continuous access. More education environments are moving toward wireless networks as the network of choice. It allows freedom of movement for students and educators and also enhances safety and security by further augmenting the ability to reach individuals quickly and respond immediately to emergency situations. Furthermore, the use of laptop computers, Netbooks, and mobile devices only seems to increase as time goes on. By integrating the preferred learning technologies with mobile platforms, we can realize flexible learning and an accommodating environment.