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Intranet: The Real Information Revolution is Happening Inside the Firewall

Warren Williams, Grossmont Union High School District

There is so much cool stuff out there on the Internet. Why, someone can surf for hours, days, and never hit the same site twice. Secretaries, directors, students and parents find themselves meshed in explorations of wonder and awe. There is so much....Digital movies, collections of them, old movies, new *avant-garde* expositions. Sounds, music, animation, real time news and games are all now *de rigueur*. Web success is measured as much by presentation and *panache* as by substance. One of the best sites I have ever visited was a text based expose on Chernobyl. It will never make the “Pick of the Week.” The Web at first blush appears to function like a human brain, but unlike its organic cousin, its axons and dendrites are not interactive. It takes a good deal of human effort and intervention to force communication between the pieces of the Internet. Herein lies the dilemma for organizations who have accepted the Web as a necessity for doing business. Connectivity, the notion that the ecology of the Web will improve productivity and learning, is not always borne out by experience. Teachers are ecstatic when their classroom gets its connection to the Web. They then often struggle trying to help students make sense of the apparent stream of conscious design of Web sites. What is real and relevant in a medium where everyone is a potential author and publisher? That the Internet is profoundly changing American political, educational and business culture is not debatable; organizations and individuals are connecting at rates that defy expectations and control, but to what benefit?

For individuals, the anarchy of the Web is its allure. Simple and ubiquitous connectivity and interaction is the design paradigm that has been the basis for the Internet’s success. The browser becomes the extension of the psyche. Bookmarks become personal history, a way to keep and organize information and direction. The individualistic approach to collecting and interpreting information has begun to permeate the desktops of institutions. Institutions are ill equipped to deal with the magnitude of the impact. Information systems managers find “it is difficult to stop the in-roads of a technology that literally anyone can obtain for nothing and install on their desktops within minutes. Resorting to draconian measures will

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CEDPA Information

CEDPA is an association of Educational Data Processing Professionals (technologists) within the State of California. Founded in 1960, the major emphasis of the association's activities are directed towards improving Administrative Information Processing in public education within the State of California and to prepare its membership to better meet and support the technological needs of the Instructional Program.

CEDPA is a California non-profit corporation, as recognized by the Internal Revenue Service.

As cited in CEDPA's bylaws, the purpose of this organization shall be:

(a) To provide information to the California public educational community concerning educational data processing via dissemination at an annual conference and through periodicals and special interest seminars.

(b) To foster the exchange of knowledge of educational data processing concepts, systems and experiences between educational data processing installations and other associations both at the state and national level.

(c) To inform the association membership of important information concerning educational data processing.

(d) To provide recommendations to the State Department of Education, State Legislature, school districts, County Offices of Education and other public educational organizations concerning educational data processing.

(e) To develop professional standards for the Educational Information Systems Community within the State of California.

Yearly membership in CEDPA is granted to attendees of the Association's annual conference. Individuals interested in the Association's mailings may request to be added to CEDPA's mailing list by writing to the address below.

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Publishing Enterprise Information on the Net

Infosystems: Web capabilities provide new opportunities for information delivery.

Ken Jones, Lodi Unified School District

How do we get the web pages published?

It used to be that we talked about how we could get onto the World Wide Web. The discussions were nuts-and-bolts about bandwidth, domain name servers, electronic mail, and the like. Most of us have gotten this initial job done and have something going on with the web. The conversation seems to have shifted now to how to maintain this new resource. Information Systems professionals in K-12 that I have spoken to are struggling with what, how, who, and why to publish information on the web.

This process was not part of our job descriptions just a few years ago. We have had our budgets reduced or maintained in recent years (certainly not increased to handle these new tasks). In addition, outside the technical community there is very little understanding about how difficult it is to get *current* stuff on the web. This appears to come from two problem areas. First, the tools for web publishing have a great deal of catching up to do before they will be the caliber of modern desktop publishing tools. Second, the technologists have trouble getting the many other departments in the organization who publish information to come up with a standard format or even to electronically forward the information to the webmaster.

K-12 organizations need to decide if web publishing is the business that they want to be in. If they decide it has value, then they need to figure out how to streamline the process and make it ingrained in the organizational culture. Here are some thoughts on how we might get them to do that.

IS must be responsible for finding, setting up, and training on the proper extensions to existing tools so that web publishing becomes as easy as selecting "save as". The recently published wizard for Microsoft Excel is an excellent example of what should exist for each of your desktop tools. IS will need to make sure that the end users understand where to save the information in the network, what file names to use, etc., so that each department is self sufficient.

So much is being written about "intranets" these days that this trend appears to be more than a fad. Intranets could be the mechanism for getting your organization's attention. If the method for distributing information becomes Netscape rather than copying machines, then

internal users are going to start demanding current content. In our little corner of the world in Lodi, we have started linking our work order database (written in FileMaker Pro) to our web server so that users can inquire on the status of their requests rather than calling us. It has not cut down on phone traffic yet, but we do mention it to each user who calls us with a question.

Finally, if we are using legacy systems, we must adapt them to publish their information in a web-friendly format. In Lodi we are evaluating new student and operational systems. A key criteria has been the vendor's present or future plans for opening up their systems to web information distribution. We are taking a dim view of vendors who respond "What's an intranet?"

I do not know that web publishing has educational value any more than programming in CPM did when I was a kid. I do know that the intranet is an excellent delivery mechanism for internal information and may become the way that IS gets the organization's attention to the value of delivering information in the 90's.

Netscape Releases Updated Version of Navigator

As reported on the ALERTS section of CEDPA's web site, Netscape recently released update version 2.02 of its Navigator web browsing program. This release provides a fix for the well-publicized bug involving the Java script manager that allowed the information on a client's hard disk to be compromised.

The update also fixed a lesser-known, but nevertheless irritating bug that became apparent with the shift to daylight savings time. Navigator's RELOAD algorithm used an internal clock that wasn't equipped to handle the shift to daylight savings time. As a result, reloads of any page originally loaded within the hour would come from cached images instead of being reloaded from the website.

The updated program for all platforms can be obtained from Netscape at <http://home.netscape.com/comprod/upgrades/index.html>.

NetDay Woes

Lessons Learned: Technology director pulls off a successful event in spite of daunting roadblocks and last-minute planning.

Kitty Sanchez-Pfeiffer, San Marcos Unified School District

Editor's note: San Marcos Junior High School in San Marcos celebrated a delayed NetDay96 activity on April 27, 1996. With some planning assistance provided by the San Diego County Office of Education, Ms. Sanchez-Pfeiffer produced a very successful NetDay activity, complete with local TV news and print media coverage. Here is her story.

In the past 2 1/2 months, I have learned more about LANs, WANs, Internet Servers, Routers and hubs than I ever intended as the Director of Technology and Information Systems for San Marcos Unified School District. I am a hardware and software person, whose experiences with networks encompassed installing ethernet cards and connecting the "baby Macs" to Sun Servers. When Superintendent Dr. Larry Maw asked if we could participate in NetDay '96, I enthusiastically responded "SURE!" I respond that way to everything so this was not unusual. Then I set upon the task of learning what network design entailed. All this new wisdom was so I would appear knowledgeable when inexperienced volunteers descended on San Marcos Middle School on April 27. That day was the culmination of weeks of planning (not one of the things I do best), shopping (one of the things I do best), consulting and designing our network.

Since school districts are notoriously poor, my first step was to recruit sponsors to fund our endeavor, provide lures to draw in the much sought after volunteers and anything else they felt that their company could provide in trade for publicity. A major software development corporation swiftly joined in the excitement. We had meetings to discuss what we were going to do and how it was going to be accomplished. They said that they would *fund it all*. After *all* was accounted for, (cable, conduit, hubs, routers, etc.) the bill was a whopping \$38,000. Our first mistake was in realizing that everything means different things to different people. So we adjusted and found additional funding for the hubs and routers. Our second mistake was not getting any agreement in writing. **ALWAYS GET FINANCIAL RESPONSIBILITIES IN WRITING!**

I had loads of help from teachers, administrators, consultants, wiring and network experts, sponsors and hardware vendors. But as I soon discovered the experts

could not agree. Finally after weeks of discussion, we decided on a 100BaseT backbone with three 10BaseT drops in each of the 70 classrooms, offices, and 6 drops in the Media Center and computer labs. This was our third mistake. **REMEMBER VOLUNTEERS ARE PERFORMING THE WORK, SO KEEP GOALS REALISTIC!**

We measured every inch of the middle school, laid the backbone, the Saturday before and shopped for supplies two days before NetDay. At our supplier, Graybar Electric, we were still deciding whether to run the conduit over the top or in the ceiling. Finally a decision was made. Graybar had everything in stock and delivered it right away. That helped avoid a fourth mistake. **SHOP EARLY.**

Friday evening was insane. Our frantic sponsor couldn't find the 100 NetDay T-shirts that were promised for our volunteers. Two teachers worked from 6:00 a.m. until way past 10 p.m. in the hopes that it would appear to volunteers that the project was organized. **APPEARANCE IS EVERYTHING.**

Saturday arrives and the weather is beautiful at 7 a.m., as it always is in sunny San Diego. I walked into the middle school and yesterday's gnarled nest of CAT 5 cable was tied neatly in bundles. Team leaders, blueprints in hand, set out to measure cable, finalize drop sites, and learn proper termination. The cellular phone rings—T-shirts have miraculously reappeared and our sponsor will drop them off before eight. **GIVE VOLUNTEERS SOMETHING BESIDES BRUISES AND SORE MUSCLES TO TAKE HOME.**

Scurrying around like maniacs, the precision team leaders had a plan for their area of responsibility. So when 9:00 rolls around and we are infiltrated with our 30 volunteers, down from 100, the atmosphere **appears** calm. After a brief introduction and training session the team leaders grabbed their staff and set to the work at hand. Their instructions were to have as much fun as possible and still accomplish something. **VOLUNTEERS NEED TO HAVE FUN AND FEEL THAT WHAT THEY ARE DOING IS IMPORTANT.**

(See "San Marcos" on Page 20)

The Millennium of Reckoning for Computer Users

Technology: Unless programmers soon find a cure for dated coding, Day 1 of year 2000 could dawn to global glitch.

From Reuters

LONDON—Computer programmers won't be doing too much celebrating on Dec. 31, 1999. As the dawn rises on 2000, many will be working overtime to correct a systems glitch that could cause chaos on a global scale.

Instead of raising glasses as the clock strikes midnight, they will be hunched over their mainframes anxiously waiting to see if their systems are ready for the third millennium.

If they don't computer Armageddon beckons.

"We designed our computer systems in the 1960s and '70s with a built-in flaw. We used a two-digit-way of putting in the year, so instead of 1955, we put in 55," said Canadian consultant Peter de Jager, describing the Millennium Bug or 2000 Glitch.

"So when the century rolls to 00 we'll think it's 1900 when actually it's 2000. If we don't fix the problem, then organizations which rely so much on technology face a tremendous risk."

The Gartner Group, U.S.-based consultants on information technology, estimates it could cost \$600 billion worldwide to correct a problem that resulted from programmers trying to save previous memory in the 1960s mainframe computers.

If the millennium bug isn't fixed, bank statements, interest payments, pension plans, delivery dates, radar for air traffic control and even defense systems could be affected.

Bill Goodwin, of the U.S.-based millennium newsletter "Tick, Tick, Tick," described the problem as "all pervasive" because computers that run just about everything will read 00 as an interruptive prompt.

Companies that do not squash the bug could fold because they will lose control.

"The stock market wouldn't function," predicted Goodwin. "A paperwork crunch will drown Wall Street if they have to do it manually."

Goodwin, who started in computer programming in

1966, said everybody knew the problem would happen. But they didn't have the budgets to correct it or thought that by 2000 the faulty legacy programs they helped to create would no longer be in use.

"The problem is simple. The solution is tedious," he said. Not all programs need to be changed, Goodwin said, just date-critical ones used in computations and comparisons.

But because the programs are more than 30 years old, even for a medium-sized company with 10,000 programs and 20 million lines of code, it could take years and millions of dollars to correct. Time is of the essence.

"There is no so-called silver bullet but there are tools that will make life easier," Goodwin added.

Computer experts said some firms have preferred to pretend the bug doesn't exist, but many governments and companies have taken steps to deal with the glitch.

Fujitsu has a project team of engineers to look into its customer needs to deal with the bug. The Japanese computer giant expects the overall costs to stamp out the problems in the country to run to about 1 trillion yen (\$9.4 billion).

"The problem is large and it will take time to deal with it," a spokesman said. The impact of the millennium bug was lessened somewhat because software using dates based on the succession of Japan's emperor, rather than the Gregorian calendar, was changed about eight years ago.

French companies also have taken advantage of re-programming ahead of the shift to a single European currency in 1999 to stamp out the bug.

In the United States, computer makers are urging customers to take steps to ease the transition and resolve problems soon. Last October, IBM Corp. announced a set of services including a 180-page document for customers to consult.

"Many customers may run out of time and not be able to alter their application portfolio if they wait," IBM said. "Also, the year 2000 problem is already beginning to surface for some customers and will occur more frequently as we approach the year 2000."

The problem will not be restricted to Jan 1, 2000.
(See "Millennium" on Page 19)

Cisco Router Training Classes Offered

Classes: Five-day session, normally \$1795, discounted for education.

Sue Mangiapane, Cisco Systems

I have talked with many of you about your need for detailed router configuration training for Educational DP Staffs. Protocol Interface, one of Cisco's training partners has agreed to offer the Introduction to Cisco Router Configuration (ICRC) Class at a special discount for Education. This five day class, normally offered at \$1795, is being offered for \$995 to Education. The first course is being held in San Mateo, June 17-21. If you would like more information or would like to enroll please call Protocol Interface and inquire about the ICRC Course for Education 415-491-8950. If you are unable to attend because of the travel involved, please send me a note. Protocol Interface would be happy to bring the course to southern California if we are able to identify 15-24 potential attendees. I have included a brief course description below.

Course Description: Teaches basic skills for understanding Cisco routers. It not only provides the hands-on experience for configuring them, it also provides a thorough understanding of all common LAN and WAN protocols in use today. The course Outline includes:

- Introduction to Internetworking
- Internetworking Overview
 - OSI model
 - Physical data link and network devices
- Application and Upper Levels
- Physical and Data Link Layers
- Network Layer
- Getting Started
- User Interface
- Router Basics
- Testing Network Operations
- Initial Configuration
- Router Configuration
- Internetwork Operating System
- Standard Protocol Suites I
- TCP/IP Overview
- IP Address Configuration
- IP Routing Protocols
- IP Routing Configuration
- Configuring XNS
- Configuring Novell/IPX

- Standard Protocol Suites II
- Configuring Banyon Vines
- Configuring Appletalk
- Configuring Decnet
- WAN
- Configuring X.25
- Configuring Frame Relay
- Configuring ISDN
- Bridging
- Bridging Overview
- Transparent Bridging
- Source Route Bridging
- Hands-on Lab

Who should attend: This course is intended for CCIE candidates, network administrators and technicians who configure and support multiprotocol inter-networks using Cisco routers.

Sue Mangiapane is Account Manager for Cisco Systems, Inc. Her e-mail is smangiap@cisco.com.

What to Wear in Palm Springs

Judy Acosta
Ventura County Superintendent of Schools

Packing for a business trip can be a real chore. You need to take "business" clothes for the day time and casual clothes for your free time (if you can find any time that's "free"). Palm Springs, the site of the 1996 CEDPA Conference, can be a very "dress up" town, but is mostly very casual or a "dress down" town.

Your CEDPA Board of Directors recommend that this year's conference should be a "dress down" or business-casual affair in keeping with the casual atmosphere of the area. Attendees are encouraged to leave their business suits at home and instead bring their more comfortable business-casual or casual attire consistent with a professional setting.

We hope you enjoy the "dress code" of this year's conference. Your relaxed Board is certainly looking forward to it. See you in Palm Springs!!!

Intranet

(Continued from Page 1)

only poison the working relationship between IS and the user community; in a time of rapid change..." [Michael Milliken, Telecommunications Magazine, 1968]

The solution for organizations lies in the development of an Internet inside the firewall, an **Intranet**. While the press has paid perhaps too much attention to the Internet, it has missed the real impact of protocol technology that relies on cross-platform simplicity. Corporations and now educational institutions are using the inherent power of the collaborative tools developed by the worldwide Web community as a front end for mission critical applications and as a way of organizing workday information. "While 1995 was clearly the 'Year of the Internet', 1996 is well on its way to becoming the 'Year of the Intranet'. Thousands of organizations have already found that internal Intranets can help empower their employees through more timely and less costly information flow. This empowerment bolsters the company's competitive advantage, improves employee moral and assists in getting more timely information to customers and suppliers." [Lee Levitt, *Internet Technologies Deployed*, 1996]. Consider the inefficient way that schools acquire, distribute and utilize textbooks in today's hectic educational environment. Textbooks are outdated when purchased. Keeping classroom sets of the same edition is practically impossible. Ordering new copies is a laborious and personnel intensive process. Textbooks don't work very well anymore. In addition to this example is the constantly evolving nature of the modern organization. Responsibilities shift frequently in response to technological implementation, fluid personnel positions, budgets and policy changes. How is all of this to be managed in a fashion that provides relevant information to teachers and students while protecting the public's investment. A great deal of effort is wasted as it is devoted to checking on process and validating the entry of information.

A standard district document like a publication of "Goals and Objectives" may cost \$5.00 each to produce. Add the distribution cost and multiply this by the number of staff, parents and public who need or want it, and then by the number of times per year it is produced or reproduced. It can be very easily seen that a substantial cost is required to deliver just a single, accurate document to educational stakeholders to allow them to perform their jobs or have relevant information. But if the hidden cost of the people verifying accuracy and quality of the information is added in, then the cost becomes even more

astronomical. And this is just one document!

Today's cost-cutting environments demand that more be done for less. Institutions need efficient internal communications tools. In fact, it is known that increased communication is absolutely essential within schools, districts and county offices. Also, the increased demands on busy staff mean they do not have the time to waste chasing down the corrected information for revision publications nor is there a means to keep a document current on a weekly or even monthly basis. Intranets can help institutions overcome the inertia of this type of inefficiency.

Intranets are the implementation of Internet technologies within the organization's firewall. The information and processes are meant for internal consumption, and are not the public face characterized by Web sites as they are known today. Their purpose is to convert and deliver as many of the organizations resources as possible, electronically to the individual's desktop and in the process save cost, time and effort. The term Intranet was coined in early 1995 and is just now coming into common acceptance.

"Vendors say they are seeing substantial growth in corporate Internets — or Intranets — where groups ranging from individuals and product teams to corporate departments are posting Web pages and installing Telnet and FTP servers. This is becoming particularly true at Fortune 1000 companies.... In many cases, Intranets have grown ... in ways that emulate the public, capital "I" Internet..." [Stephen Lawton, *Digital News and Review*, 4/24/95]. Many products will soon be taking on new life as Intranet tools and legacy products and ideas will become Intranet compliant. Consider the following passage from an abstract written for the Internet Society.

"IS and functional department managers quickly identified the power of the..(Internet's tools)... as a resource to be leveraged on the corporate network as well. Forrester Research interviewed 50 Fortune 500 companies and found that fully two-thirds already have or are considering some involvement with Intranet applications. These companies have identified the Intranet as a powerful mechanism to make information more readily available.

With corporations under tremendous pressure to empower employees and to better leverage internal information resources, Intranets provide a highly effective

(See "Intranet" on Page 12)

Lemon Grove schools tops in high-tech talk

Steve Schmidt, San Diego Union-Tribune

LEMON GROVE—Green lights, red lights, glowing computer monitors, oscilloscopes, wires and cords this way and that. Must be Darryl La Gace's office.

La Gace eyeballs an oscilloscope on a recent morning, a tiny screen showing the heavy amount of microwave radio traffic between schools in this town.

"Just about everybody's doing stuff right now," he says.

Stuff like taking classroom attendance at schools. Stuff like writing e-mail to the White House or assembling flashy multimedia presentations for class.

At a time when school districts countywide have jumped on the computer bandwagon, the 4,300-student Lemon Grove School District has plugged in in a big way.

In fact, some technology experts say the eight-campus district is helping to set the pace for how schools use computers.

"They're among the leaders in innovative technologies in the county," said Skip Sharp, director of information management with the county Office of Education. "They're out leading the parade."

Which brings us back to the manager of the district's computer system, La Gace, and his Lincoln Street office. The small room is chock-full of computer hardware.

The office is the heart of a microwave radio transmission system that provides a two-way computer link between district offices and nearly all classrooms.

In many school districts, classroom computers are often tied to small networks that don't even reach off campus. Some computers aren't even linked to a network.

But the Lemon Grove district has created its own scholastic global village, using microwave radio dishes scattered around the city.

Teachers are using computers equipped with Windows 95 to take daily attendance, shipping the figures to district staff each morning with the stroke of a button.

They also log and track grades for each student, along with class schedules and other information.

Students use the network as a gateway into the Internet, tapping into the treasure trove of resources available online. Desktop monitors are linked to CD-ROM software housed in La Gace's office.

"We're teaching skills (the students) can use lifelong

in whatever class they are in," said Barbara Allen, principal at Palm Middle School.

District staff and students exchange electronic mail with each other and others, even with the White House, through the centralized microwave system.

On the Palm Middle School campus recently, students enrolled in a computer multimedia class bounced around the Internet, conducting research for their classes.

"It's easier on a computer to do your reports," said 12-year-old Candace Martin, a seventh-grader. "It's faster."

According to Superintendent Joseph Farley, Lemon Grove was the first school district in the nation to install a microwave computer network.

With an initial investment of \$162,000, the district bought the microwave system about three years ago, La Gace said. Each school also used grant money, private donations and other funds to purchase desktop computers and to wire classes.

Each campus has a microwave radio dish that transmits and receives data from a 95-foot microwave tower just outside of La Gace's office.

Because the network is centralized, it costs relatively little time and money to maintain, according to district officials.

"It enables us to manage a fairly large network with a small staff," La Gace said. "We're basically getting a lot with very little amount of money."

The technology cuts down on competition among campuses because the same software is made available to all the schools through the microwave network.

The district gets frequent calls from other schools interested in the technology.

County information director Sharp said other East County districts on the leading edge of computer development include Santee School District, Lakeside Union and Grossmont Union High School District.

"Now we have school districts from all over the state that are following our lead on this," said Superintendent Farley. "We get calls from all over the country."

Steve Schmidt is the Education Writer for The San Diego Union-Tribune. His article originally appeared in that newspaper on February 21, 1996, and has been reprinted by permission from the author. His e-mail is steve.schmidt@uniontrib.com.

Fall Conference Breakout Session Preview

Judy Acosta, Ventura County Superintendent of Schools

Mark your calendar for the CEDPA Conference on October 16-18, 1996, in Palm Springs at the Palm Springs Marquis Hotel NOW!!! There's lots in store for you. Some of the sessions to be presented are:

How to Survive a Computer Audit - "The Auditors Are Here!" No other phrase can be so unsettling to an information system manager. Each year, more audit firms are including a detailed review of information systems as part of their regular audit. This presentation shows you what the auditors are looking for, what documentation you will need, and how to deal with common situations. You will receive a comprehensive checklist to make sure your department is in order. Presenter: Vincent Turner, Vavrinek Trine Day and Company

California School Information Services (CSIS) - The presentation will describe the status of the funding proposal to the State Department of Finance for fiscal year 1996-97 for CSIS implementation, subsequent activities undertaken since the new fiscal year, and an update on demonstration project progress.

Presenter(s): Jan Volkoff, CSIS Coordinator, CDE; Kathleen Barfield, CSIS Director, WestEd; Lynn Baugher, Administrator, Educational Demographics, CDE.

They Want Internet—What Do I Do? - This presentation is an overview of some of the things people should consider before they take the plunge. Considerations will be cost, platform choices, skills and manpower requirements, partnership building schemes, etc.

Presenter: Bob Owens, Network Administrator & Director of Bay Area Educators Network (BAE-NET).

EGGMAN (Elk Grove Greater Metropolitan Area Network) - How to negotiate, design, and implement a voice, video, and data metropolitan area network.

Presenter: Charles Burns, Director Information Services, Elk Grove Unified.

Technology Vision Into Reality - The vision that became the plan - Desert Sands Unified School District is one of the most technologically advanced school districts in the country. See a multimedia presentation of the description of the district Microwave network. The network provides connectivity to 21 schools, which allows every teacher and administrator to be online accessing Internet, e-mail, and standard software. Lots of good things to see in this presentation. Presenter: Dr. George Araya, Technology Coordinator, Desert Sands Unified

School District

Moving From Mainframes to a Distributed Network: A Case Study of the San Diego School District - It sounds too good to be true—a school district that runs as efficiently as a well-oiled corporate machine with a network delivering not only an intensive technology curriculum but also carrying important faculty and administrative data. It's happening now at San Diego Unified.

Presenters: Bill Honniker, Software Systems Analyst, Anne Skelton, Data Communications Analyst; Richard Fabian, District Educational Technology Specialist.

Wireless WANs - Bandwidth on a Budget - Design, testing, and implementation of various technologies.

Presenters: Dave Paulson, Director, Data Processing, Bob Thomas, Network Technician, Fairfield-Suisun Unified School District.

Internet Performance and Security Issues - Deploying caching proxy servers to improve internet performance and security.

Presenter: Farley Stewart, Director of Marketing, Internet Products Inc.

Acceptable Use Policies - This presentation will be a hosted discussion by panelists to review the variety of ways possible to implement acceptable use policies for students and staff. Different provisions from a number of policies will be presented.

Presenter: Warren Williams, Director, Computer and Technology Services, Grossmont UHS Dist.

Internet Technical Academy - The ITA is a clearing-house of technical training and support services available to California's K-12 Education Community. This presentation will show you how to identify available resources and articulate your need for courses and other training resources.

Presenter: Andrea McCurdy, WestEd

Free Computers For Every Student and Teacher - Learn how San Francisco Unified is accomplishing this within their district. You won't want to miss this one.

Presenter: Eric Boutwell, Information Technologies Manager, San Francisco Unified.

These are just a few of the breakout sessions—there are lots more. Look for a complete program listing in the Conference Announcement which should be coming your way in July.

April SIG Meeting Summary

Palm Springs: Technologists hear about Microsoft's Back Office products and discuss IS issues in a relaxed setting.

Darryl La Gace, Lemon Grove School District

April's SIG meeting featured an overview of Microsoft's BackOffice products with special emphasis on NT Server. This was the first in a series of SIG meetings to provide an in-depth look at Microsoft's powerful networking solutions. The event was held at the Palm Springs Marquis Hotel, the location of this year's CEDPA conference. Elisa Bartell, Education Market Manager at Microsoft, coordinated the presentation given by Kurt Shintaku, a Microsoft Systems Engineer. Thirty-three people attended the session.

Microsoft's BackOffice Suite includes a host of powerful programs based on and including the Windows NT Server platform. Kurt took us on a visual tour of each of the components of BackOffice and showed us how they are tightly integrated. He also talked about the integration tools and how Windows NT Server can coexist in a NetWare environment. Kurt's presentation concluded with an exciting preview of NT Server 4.0. Windows NT Server 4.0 provides dramatically improved application services networking while acquiring the familiar interface of Windows 95.

The presentation ended at noon, leaving the rest of the day for our usual round table discussions. The topics ranged from Windows 95 to wireless WANs. The group brought many insightful responses and experiences to the topics at hand. These discussions continue to be the catalysts for new ideas and solutions. Thanks to all who attended for contributing their expertise and many thanks to Elisa at Microsoft for taking a personal interest in making this series possible.

June's SIG continues its series on Microsoft's networking solutions. This time we will focus on Microsoft's Internet strategy and Microsoft's current set of powerful Internet tools including Internet Explorer, Internet Assistants, FrontPage, and Internet Information Server. The Internet Information Server extends the power of the Microsoft BackOffice to the Internet. As always, the meeting will be an informative one. It will be held in San Diego at the Hotel Del Coronado on June 5th. To register, call Darryl La Gace at (619) 589-5734, or E-mail me at dlagace@lgsd.k12.ca.us.

Microsoft Offers Discounted Products

Elisa Bartell, Microsoft Corporation

Editor's note: Ms. Bartell submitted the following items from various Microsoft news releases and newsletters.

Microsoft TechNet

Microsoft TechNet is now available at a discount to Education Institutions for \$419 (this is the single server price—compared to the current server subscription price of \$699).

Microsoft TechNet is the official source of technical information for those who support or educate end users, administer networks or databases, and recommend or evaluate information for technology solutions on Microsoft products. The monthly Microsoft TechNet technical information CD includes; Resource kits, datasheets, whitepapers, evaluation and deployment information, case studies and the entire Microsoft Knowledge Base. TechNet also includes a monthly Microsoft Drivers and Patches CD that contains current drivers and patches for Microsoft products.

For more information, call the TechNet Subscription Hotline at 800/344-2121 and request Part Number #323-0001 or contact Microsoft Inside Sales for general information at 800/426-9400.

Windows 95

For the next few months, qualified education institutions in the U.S. can buy the Windows 95 upgrade or the full version of Windows 95 for new users at the special price of \$19.95, plus shipping and handling. The minimum order is five copies.

To facilitate technical training, each K-12 institution that orders Windows 95 through this program will receive a free copy of "In & Out of the Classroom With Windows 95," a practical resource that offers teachers guided, self-paced lessons and hands-on activities demonstrating the features and capabilities that make a Windows 95-based PC easier and friendlier to use.

For more information, education institutions should visit the Microsoft web site at <http://www.microsoft.com/k-12/win95/>.

Elisa Bartell is an Education Account Representative for Microsoft. She can be reached at (310) 449-7300, ext 7344, or by e-mail at elisaba@microsoft.com.

Spread Spectrum Wireless vs. ISDN, Part I

Networking: Radios provide alternate means of connecting sites to District's WAN.

Terrell Tucker, Panama-Buena Vista Union School District

The Panama-Buena Vista Union School District made a decision in February, 1995 to provide Internet access to its four junior high schools. Each school has a Novell LAN with a lab of 30 newly purchased, multi-media, IBM-compatible computers. The goal was to incorporate surfing the Internet into our computer science course as a new junior high requirement. The LANs have been in place for as long as five years, but no links for a WAN had been installed.

We began looking for possible ways to link the schools together. With the Education First program underway, ISDN appeared as the best solution from the very beginning. In early summer, five ISDN circuits were ordered to connect the four junior high schools and our Technology Center (teacher training center) to the District Office. We decided to purchase Cisco routers from Pacific Bell to limit our exposure to only one vendor. Pacific Bell would also be responsible for setting up and configuring the routers. The ISDN lines and equipment were installed in mid-November, barely meeting our deadline to provide Internet access starting December 1.

The Internet suddenly became a part of our curriculum and Internet access response time was good. We did, however, see a problem with our new WAN. Any access involving IPX was intolerably slow. Any attempt at file transfer or remote server management over ISDN was not feasible due to very slow speeds.

Even though IP access met our expectations, we began looking elsewhere for wide area links. Remote server management and configuration was a goal from the beginning of our endeavor. We had become convinced that ISDN would not be a permanent answer in an IPX environment.

Early February brought our first experiment—without wireless. We had investigated 10 mb microwave, but it had a high price tag. A demo of 2 mb equipment from Solectek was arranged to be installed at one of our networked elementary schools. The low level Bridge Plus units were installed at both ends with simple directional antennas. The link distance is approximately 2.2 miles with no obstructions other than a few large trees. A strong signal was immediately attained and the testing period had begun.

The first thing we did was transfer a large file, about 2.5 MB in size. An initial transfer over ISDN took over 7 minutes. The same file transfer over the new wireless link took 53 seconds. Incidentally, there was no other activity over either line when the transfers took place. Curiously enough, Internet access over the wireless link appears to be approximately the same speed as with ISDN.

As might be expected, our wireless demo did bring some bad news. We started the demo with some perceptions that have turned out to not be exactly true. We hoped to be able to place omni-directional antennas on the District Office with directional antennas at each school site. We also thought the price would be about \$7200 per site. That was a bit more than we wanted to pay, but would have a two-year payoff when compared to ISDN. We then learned that Solectek's omni-directional antenna installations had some collision avoidance problems. Solectek solved this problem with a form of token passing, but added another \$1000 to the cost of the equipment. All of a sudden, we were looking at approximately \$8500 for equipment at the remote end ONLY!

We have purchased the Solectek equipment at a special one-time-only price and new conversations have begun with a company called Breeze Com. They offer 3 mb spread spectrum solutions. On the surface, the price is much better and many problems seem to already be solved. We hope to replace our ISDN links this summer before the free first year (Education First Program) ends. Hopefully, part II of this article will be found in the next Databus and will include some answers to our questions.

SIG MEETINGS

- SIG Meeting (South)
June 5, 1996
Hotel Del Coronado, San Diego
- SIG Meeting (North)
July 12, 1996
San Francisco area
- SIG Meeting (South)
August, 1996
Microsoft, Irvine

Intranet

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communications platform, one that is both timely and extensible. A basic Intranet can be set up in hours or days and can ultimately serve as an 'information hub' for the entire company, its remote offices, partners, suppliers and customers.

Intranets offer the following application feature set:

- rapid prototyping (can be measured in hours or days);
- scalable (start small, build as needs, requirements allow);
- easy navigation (internal home page provides links to information);
- accessible via most computing platforms;
- can integrate distributed computing strategy (localized Web servers residing closer to the content author);
- can be tied in to 'legacy' information sources (databases, existing word processing documents, groupware databases); and
- extensible to a variety of media types (audio, video, interactive applications).

The benefits to these features are many, including:

- inexpensive to start, requires little investment either in dollars or infrastructure;
- significantly more timely and less expensive than traditional information (paper) delivery;
- distributed computing strategy uses computing resources more effectively;
- users familiar with link metaphor from surfing experiences; and
- open platform architecture means large (and increasing) number of add-on applications available.

Intranets leverage the concept that the Web browser is quickly becoming the universal information interface. An increasing number of workers gain Internet access from their work desk every day and are becoming accustomed to retrieving information through the now ubiquitous browser. While most of this information today comes from beyond the firewall, International Data Corporation reports that even in 1995 sales of Web servers for Intranet use outdistanced those sold for Internet use." [Lee Levitt, Intranets: Internet Technologies Deployed Behind the

Firewall, 1996].

The Intranet offers the educational institution an ability to organize and disseminate information in a comprehensible, timely and revisable format. It also offers an emergent tool set that will enhance and foster collaboration, engage learners with a relevant and media-rich presentation and provide teachers with curriculum and resources that are immediately accessible. Whether in a computer lab or on a teacher workstation, that information that is necessary for productivity can easily be arranged into a Web page. Lesson plans, media and film bookings, email, resources for classroom presentation and primary and secondary research documents are only a click of a mouse away. The resources can be arranged for a single department, a school or district-wide. Students can assist in the design and implementation of much of the information. They are proficient at using HTML and other tools. The Web is second nature to many of them. Existing site and district equipment can provide much of the infrastructure. Servers can be created on Macintosh or Windows NT computers connected to a network.

Given a schoolwide or districtwide adoption of Intranet strategies, the diversity of applications of Web technology can be applied to the teaching and learning process and to organizational activities. The following represent a few examples for Intranet application:

1. Publishing documents: Student handbooks, School Accountability Report Cards, principal's message, school maps, supervision assignments, extracurricular activity schedules, student work, Focus on Learning accreditation reports, virtually anything that can be digitized.
2. Individual, Department, School, District Web pages: Searchable information about necessary information can be located on pages. All groups of teachers can be contacted through simple search engines.. When reorganization happens, information can move from one page to another. District departments can post process, procedures, calendars and help desk information. Job descriptions, salary schedules, hours of operation, the entire electronic culture becomes available.
3. Providing and Collecting Information: En-

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Intranet

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rollment in staff development activities, staff and student surveys, assessment, network accounts, and activities can all be a function of Web based applications. Individuals can monitor personal payroll and employment information. Students can access their own grades and portfolios.

4. **Communication:** Email, remote and distance learning and conferencing, chat rooms, video and audio clips. Individuals can talk and interact with other individuals or groups.

This power to organize and arrange information is extremely simple by comparison to previous methodologies provided to IS organizations. Intranet technologies have an elegant simplicity that drastically impacts and recreates the nature of information management. A single point of entry front end is the model that now permeates the Internet. That same model will be demanded by users of educational institutions. JSB Computer Systems, Ltd. of Great Britain has analyzed the impact of the Web interface. "The Intranet technology is evolving so rapidly that the tools available, in particular HTML, can be used to dramatically change the way we interface with systems.... With HTML you can build an 'End User Comfortable Interface' which is only limited by the creator's imagination. The beauty about using Intranet technologies for this is that it is so simple. Hitting a hyperlink from HTML does not necessarily take you to another page - it could ring an alarm, run a year end procedure or anything that a computer action can do. Microsoft's Windows 3.x and Windows 95 created tremendous volumes of functionality, but individuals probably only need 5% of the total functionality. The other 95% caused support pain, headaches and disruption. Now, with Intranet tools, you can paint reality in HTML and make an in-context and uniform front-end to all computer-based resources. In doing so, not only can you create interfaces that users can use and appreciate, you can also remove the 95% functionality and access to elements that specific users don't need - getting rid of most of your (support) headaches in one sweep."

Lee Levitt outlines a strategy for deployment of an Intranet that is readily adaptable to educational institutions. His points for consideration include:

Setting up an Intranet

Intranet applications are scaleable - they can start

small and grow. This feature allows many schools or districts to "try out" an Intranet pilot - to publish a limited amount of content on a single platform, and gauge the results. If the pilot proves promising, additional content can be migrated to the Intranet server. Don't start with forms and CGI's. Start with simple text-based applications. Manage the look and feel of approaches before getting too complicated. Make design mistakes early in development while things are fluid and easy to change.

Getting Started

The first step in building an Intranet is to identify a likely school or department for deployment. A quick sampling of the paper flow or energy level of a group within the organization may point to a likely candidate, whether it be the school or district newsletter, human resources or employee benefits handbook, student project information or someone already doing Web pages. The more ambitious IS managers may want to look at information needs and build an information flow strategy from scratch (not trying simply to deliver previously paper-based information electronically).

The second step is to identify the content source or author - the person actually responsible for the intelligence behind the information and for getting it down on paper. Where does the information currently reside? Is it in a series of Microsoft Word or WordPerfect documents? Excel spreadsheets? Lotus Notes, Oracle or other database? Should this particular person be responsible for "HTMLizing" the information, for serving it on their personal computer?

Further study will uncover other authors of similar situated pieces of information, most likely leading to a distributed content development and serving strategy. Individual content owners, most likely student groups, department chairpersons, managers and individual contributors, save their documents to HTML or leave them in their original format and forward them to a group publishing expert. This could be a secretary, teacher or administrator who has some desktop publishing skill. This expert, who may already have desktop publishing responsibilities for the group, can convert non-HTML documents quickly using a pre-defined template for consistent look and feel with any number of HTML converters.

The content can then be forwarded to a Webmaster

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who can apply it on a system running other educational and administrative applications, aggregating both the management and security activities for the content. Thus the content is available to anyone with appropriate access rights to the site.

Likely Content

Organizations must determine whether information should be made available via a Web server, via email, or through some other means. If the information is of general relevance, such as union contracts or salary schedules, it can be posted on a Web server so that when people require this information, they click on Union Contracts from the Human Resources page, and receive the most current information.

Many districts will find building Web interfaces to “legacy information” as a key application. With appropriate tools, end users can build simple point and click access to this legacy information without any programming, making it available to non-technical users through their Web browser. Key database applications include: student records, warehouse information, inventory, technical problem tracking, CBEDS reports, enrollment projections. In addition, individuals can quickly set up inservice or training registration forms for short term usage, loading the registrants’ information into an easily manipulated database.

Conversely, interoffice email may be more appropriate for “interrupt-driven” time sensitive information, particularly for a focused group of recipients. “Our Governing Board is stopping by for a visit of your school on Wednesday.” In this situation, the Web server can be used as an extended information resource: “Before they arrive, please be sure to check the internal Web server link Board Visitations for more information on the reason for this visit.”

Selecting a Likely Pilot Candidate

Typically, districts will begin a pilot with existing content that is delivered via paper, whether it is an employee benefits manual, curriculum guide, or staff development information. It is important, for the sake of the pilot, to choose a candidate in which both the time and results can be tracked and measured. Schools also will find it useful to be able to measure the improved efficiency or ease of collaboration with the switch in information distribution strategy.

For instance, usually a district can directly measure the cost of duplicating and distributing copies of its employee benefits manual. When this traditional process is moved over to an Intranet solution, the savings in direct costs can be taken directly to the bottom line, and the incremental costs of managing the content on the Intranet server can be tallied and easily justified.

On the other hand, the costs of informal information publishing, such as a curriculum guide, may not be directly measurable. Therefore, the move from traditional paper-based information flow to the Intranet may not result in direct measurable costs savings.

In these instances, it is important to focus on the value of enhanced access to information, and anecdotal accounts of the value may be helpful in measuring the results of the pilot. Statements such as “I was able to assist three new teachers overcome classroom problems because I had the information at my fingertips, and I knew it was current. With the old system, I was always putting the teacher on hold and trying to arrange for the delivery of appropriate information...” illustrate this value.

Once the value of an Intranet solution has been established through such a pilot, it can be expanded into other departments and functions. In addition, access to other legacy information can be provided, so that employees can search and update student databases, vacation days, or register for training classes.

Organizational Issues

Typically, Intranets are based around functional department support - technology services, human resources, physical education department, schools. It is entirely appropriate, and usually beneficial, for those departments to take responsibility for both developing the content for the Intranet Web pages and for keeping it updated. In this manner, the content owner can publish the information more quickly and the users or consumers of the information can apply it to their advantage more quickly.

Challenges

The technical capabilities of Web servers bring up certain organizational challenges, including:

- security;
- privacy; and
- recency.

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Intranet

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Each of these issues, and many others, can be resolved through careful planning and implementation of an Intranet strategy.

Security

Security is a multi-headed issue. First, security can be defined as providing access by the appropriate personnel to the correct information, while at the same time barring access to all others. Most popular Web servers today allow such access configuration on a user/group/realm basis, while some in fact, allow the systems administrator to go far beyond this, allowing them to limit access rights by specific IP address for individual pages. This capability would potentially allow the systems administrator to set access to financial records or student files only for the personnel in specific departments. In reality, this will be a major task for IS managers as students, teachers and administrators are all on the same network. Significant human and network resources will need to be deployed to either route student traffic away from mission critical applications or design security systems that prevent hacking of important data.

Second, security may include encryption, also at several levels. Again, popular Web servers offer SSL encryption for communications between the server and browser, effectively scrambling the message and keeping it from interception. Encryption may also play a role if the Intranet application spans multiple organizations or locations - effectively a virtual private network running over the public Internet. This is particularly relevant for County Offices of Education who must service a number of Districts. An increasing number of organizations use their public Web servers in this manner - setting certain pages for use only by partners or customers through access control. Intelligent firewall solutions can create "tunnelling" applications that establish and keep open trusted communications lines between sites for further security.

Finally, security of the local area network within the school, district or County infrastructure and from the Internet is an important issue. Intranet servers may offer proxy servers as part of the Web server. Proxy servers handle HTTP, gopher and FTP requests and can be configured to restrict/allow these functions for each host. Proxy servers sometimes offer caching which means the Web server will cache Web pages, FTP and gopher data

allowing client requests to be served by the local proxy. This reduces Internet requests and requests between Intranet Web servers.

Privacy

Privacy is largely an organizational issue, clarified and intensified by the potential capabilities of technology to invade one's privacy. In this area, Intranet applications can either assist in maintaining users' privacy, or potentially invade it if the developer or systems administrator is not careful.

Privacy can be enhanced by the use of Intranet applications through the delivery of sensitive information in a largely anonymous manner. While the interoffice mail staff may snicker (or worse, peek) when they deliver a memo marked confidential, the Intranet server will serve all pages with no similar bias or prejudice. Employees can feel free to review the Employee Assistance Program information at their desktops. Similarly, they may browse information on Board Policy or Sabbatical programs without fear of raising eyebrows (or gossip) from their managers or from personnel representatives.

On the other hand, some of the tools taken for granted in the Web server marketplace, such as the site log, do have the potential for invading privacy. Intranet administrators must balance the desire to track visitors (and therefore, value attained from the site) with the need for privacy with regard to certain content. It may simply be inappropriate for the company to track who has visited the Employee Assistance Program page, particularly since those with access to the log files may be IS rather than human resources personnel.

Recency

While Intranets allow information to be updated instantly, by no means do they guarantee recency. To this end, publishers must be committed to keeping the Intranet site up to date, and certain steps may be taken to ensure that consumers of the information use it appropriately. Simply putting the "date of last change" on each page will help tremendously in this respect, allowing a browser to check that the information is indeed current.

In addition, certain pages, such as competitive matrices, should have regular updates or "refreshes" scheduled, along with someone identified to provide instant

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updating as soon as new competitive information is received. In this way, browsers can trust that the information represents the competitive wisdom of the organization.

Other steps, such as providing an email address or telephone number of the author, can further assist in the use of the information, as users will be able to contact the author to request further information or clarification on specific points.

Tools Used

A number of basic Intranet publishing tools make this new paradigm possible. First, in addition to the Web browser, Web servers are available for a variety of platforms found in the typical organization, including all flavors of Windows, Macintosh, NetWare, OpenVMS, UNIX, OS/2 and many others. This general availability allows publishing from virtually any computing environment.

Second, an increasing number of tools empower the user to create HTML for the Intranet application. Many, if not most of the popular word processing packages, allow documents to be saved as HTML, and tools are beginning to enter the market that allow for large scale migration of content from traditional word processing format to HTML. These tools allow the non-sophisticated user to continue to create content in their familiar application and to move this content to the server without having to manipulate each file or document. [Lee Levitt, *Internet Technologies Deployed Behind the Firewall*, 1996]

The acceptance of Intranets in such a short time by so many organizations speaks to the power of the tool for managing information across schools, districts and county offices. Caution must be exercised as hidden costs can temper even modest deployments. There is also a consequent management burden that needs consideration. Educational institutions will need to invest in retraining IS personnel to take advantage of the current technologies. The result of successful implementations can lead to improved collaboration, increased learning, more efficient workers and more successful organizations. The power of the Internet when applied to educational institutions can have a truly liberating effect on the enterprise. Much that had seemed unachievable will be possible. Issues of equity, quality, rigor, efficiency, responsiveness and creativity can all benefit from effective Intranet strategies.

May SIG Summary

Java: Several gather at Sun Microsystems to hear about Sun's strategy for K-12 education and see some product offerings.

Eric Boutwell

San Francisco Unified School District

Java was the overall theme at the May SIG meeting. Sun Microsystems hosted CEDPA members at their Palo Alto facility. Sun started with a one hour Java overview and where Sun and the industry are heading.

All attendees were requested to sign a non-disclosure agreement so I can't report all that we learned. I can say however that Java is going to be big in education. Java is going to be all over the Internet and on K-12 Intranets. When you realize that every major computer operating system company is building Java technology into their operating systems you know this is not going to go away. We in the K-12 area who are designing networks need to know more about this technology and how it is going to drive us to provide higher bandwidth lines to all our schools. Java is hot and getting hotter.

After the Java discussion and demo we went to what I believe is the most interesting part of our SIG meetings—the general discussion where each attendee can ask about and have discussed any topic that is of interest to them.

The main topics discussed in May were:

1. Firewalls and security—who is doing what?
2. How do you cost justify the high cost of building and maintaining high bandwidth Intranets?
3. Intranet— who is doing what?
4. What are people doing about the turn of the century problem?
5. Setting up phone switch systems.
6. What software applications help in setting up and managing Intranets and Internet systems?
7. How to handle the setting up of teacher and student E-mail accounts?

The wealth of knowledge that is shared in these discussions is inspiring.

Sun then shared their view on data warehousing and distance learning using digital video. Digital video didn't seem like it was quite up to prime time in the K-12 environment but it's coming.

A big thank you to SUN Microsystems for hosting this CEDPA SIG meeting. See you at the next SIG meeting or at the CEDPA conference in October.

Network Nomenclature

Terminology: Understanding is essential when working with engineers and architects.

Addison Ching

As I come in contact with various school agencies, I find that talking about network design often brings blank stares. There are so many different terms to describe the various components of the network infrastructure and communication often gets muddy, especially when architects become involved.

It is important to have a thorough understanding of network terminology because it is at the heart of designing and implementing a successful network. Higher bandwidth networks will not operate properly with wire and connectors “thrown together.” As much as it might work at Ethernet (10mb.) speeds, it will certainly not work, or at the very least, offer poor performance at higher, 100-mb. Fast Ethernet speeds.

Here, in a nutshell, are some terms that are often used when discussing networks and network design.

Cable Identification

Cable is identified by an A-B-C identification scheme. **A** represents the speed in Mbits/second, **B** is either **base** for baseband or **broad** for broadband transmission, and **C** refers to the meters per segment multiplied by 100.

10Base-5 - (Thick) coax cable with maximum segment lengths of 500 meters.

10Base-2 - (Thin) coax cable (thinnet) with maximum segment lengths of 185 meters or about 600 feet.

10Base-T - Twisted-pair cable with maximum segment lengths of 100 meters or about 320 feet.

10Base-F - Fiber-optic cable backbone with maximum segment lengths of up to 4 kilometers at 10Mbits/second; approved by EIA/TIA for cross-connects between school campus buildings.

100Base-X - A new standard that describes 100Mbits/second throughput using twisted-pair cable.

Data Grades of Cable

Category 1 - POTS (Plain Old Telephone System) voice-grade cable used in analog telephone systems.

Category 2 - up to 4mb bandwidth.

Category 3 - up to 16mb bandwidth.

Category 4 - up to 20mb bandwidth.

Category 5 - up to 100mb bandwidth.

EIA/TIA 568

A commercial building wiring standard developed by the Electronic Industries Association (EIA) and the Telecommunications Industries Association (TIA) that addresses how wiring should be installed in commercial buildings. The standard provides for a uniform wiring system and supports

products and environments from many vendors. Addressed in the standard are wiring system structures, work areas, schemes for horizontal wiring, telecommunications closets, equipment rooms, backbone wiring, and entrance facilities.

Fiber Optic Cable

A special cable comprising glass or plastic strands or conductors to transmit information using light instead of voltage. Fiber optic cable is not subject to conditions that affect the performance of standard copper cable including signal loss, capacitance which distorts the signal, and crosstalk which leaks signals from one set of wires to another. Fiber optic cable is resistant to outside interference from electromagnetic radiation (ignition noise, diathermy, etc.) and does not radiate signals as do copper conductors. Due to its low signal loss, fiber optic cable can be used for longer distances.

Fiber optic cable comes in various configurations. **Multimode** fiber is most commonly used due to its lower costs. Multimode fiber has a higher dispersion rating, is normally used in LAN environments, and uses light sources generated typically by light-emitting diodes (LEDs). Since LEDs generate light in a less-direct (dispersed) path, signal loss is greater. However, multimode fiber is easier to install and handle and LED light generators do not require special protective equipment. **Single mode** fiber has the highest bandwidth and distance ratings. This fiber optic cable uses a higher-precision light source (laser) which can permanently destroy eyesight if improperly handled, and requires more precise installation but can be used for greater distances and bandwidths.

Fiber optic conductors are encased in a protective coating (cladding) surrounded by a plastic buffer and DuPont Kelvar for strength. An outer jacket completes the cable composition. Normally, cables comprise multiple fiber conductors in various combinations. A 6/6 cable has six single mode fiber conductors and six multimode conductors.

Various methods of terminating fiber are utilized, but the **ST** series of connectors are most commonly employed.

5-4-3 Rule

A design rule that is applied to Ethernet networks when cascading or daisy-chaining hubs. It states that between any two devices there shall be

- No more than 5 segments;
- No more than 4 repeaters; and
- Only 3 of the segments may be populated.

For illustrative purposes, a **device** is a computer, and a **repeater** can be either a real repeater or a hub. A **segment** is a portion of the network between any two active components

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Nomenclature

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such as between hubs or between a hub and a device. The rule states that between any two computers, there can be only *four* hubs. In the situation where classroom computers are connected to a workgroup hub located within that room which in turn connects to the IDF then the MDF then to an IDF in another building and then to the workgroup hub in another classroom and finally to a client computer in that classroom, the 5-4-3 rule is violated because there are actually five hubs in the data path.

Also, when cascading or daisy-chaining hubs, only three such cascades can exist.

Hubs

A hub is like a network junction box, allowing multiple devices to be connected together without interfering with each other. Hubs normally support a fixed number of connections, typically in groups of eight, twelve, sixteen or twenty-four, depending upon the manufacturer. Hewlett-Packard manufactures hubs that support fifteen ports.

A workgroup hub is a small device that provides only the basic services of a hub. Workgroup hubs normally support eight connections; some have a ninth connection that can be used to cascade or daisy-chain to another workgroup hub. Typical placement of workgroup hubs are in workgroups—classrooms, offices, or libraries, where a small number of computers need to be clustered together.

A SNMP-capable hub is a much larger device, typically rack-mounted, with added electronics and intelligence to allow it to communicate using SNMP commands to a central administrative program on the network.

A stackable hub is normally SNMP-capable and includes the connection configurations of typical hubs. Stackable hubs also have a special hub interconnect that allows multiple hubs to be literally “stacked” or connected in parallel to provide up to 260 or more individual connections without violating the 5-4-3 rule. Stackable hubs are normally located in IDF facilities.

A segmented hub is a hub that can be specially configured by dividing the hub’s bus into segments joined by common connections (backplane.) Modules are plugged into the backplane and connect with any other modules over the bus to form logical LAN segments.

A switched hub has the characteristics of a segmented hub except that it allows LAN microsegmenting to reduce contention. For example, a file server could be placed on its own LAN segment by itself to increase the file serving throughput. Switched hubs allow configuration by logical or common use and “switch” or bridge network traffic between segments with communication between devices on different segments becomes necessary. Switched hubs also allow the switch’s bandwidth to be portioned to individual segments. Switched hubs are sometimes used at the MDF to segment network traffic and to ensure that the 5-4-3 interconnect rule is not

violated because of excess hubs in the segment.

Interduct

A special protective conduit for fiber optic cable, normally recognized by its bright orange color.

Intermediate Distribution Frame (IDF)

The Intermediate Distribution Frame is a satellite distribution point located in a wiring closet of each network segment. Typically, separate IDFs serve each building. IDFs comprise the backbone feed from the MDF, a distribution hub, and a patch panel. Classroom feeds from each classroom within the building converge at the IDF.

Local Area Network (LAN)

A network that resides in a local area, usually at a school site or administrative campus.

Main Distribution Frame (MDF)

This is the main distribution facility of a network, often described in other terms such as “main hub” or “central hub.” This is the starting point of the site network, typically where the site router, outside connections, and the site network backbone all converge.

Patch Panel

As the name implies, a panel with multiple jacks that typically connect to wiring that feeds individual terminations in classrooms. The patch panel acts as a network switchboard; only those connections that are active are “patched” using station cables to the IDF hub’s ports.

SNMP

This acronym stands for Simple Network Management Protocol, a subset of TCP/IP commands which allow network devices to be remotely administered on the network. For example, any equipment supporting this feature can be automatically detected as malfunctioning, be isolated from the network, diagnosed remotely, and the problem fixed or the faulty equipment removed from service, all from a remote location. Typical use of SNMP in a school district setting would comprise a monitoring control program at the network central administrative site that would continuously monitor all SNMP devices in the entire district network. All SNMP devices are typically represented by green icons that turn red when a device detects a problem.

Station Cable

An interconnecting cable with RJ-45 connectors on each end, in lengths from 3 to 15 feet or more, and used to connect computers to wall terminations or patch panels to hubs.

Termination

(See “Nomenclature” on Page 19)

Nomenclature

(Continued from Page 18)

A specially-designed jack used for network connections, that “terminates” the cable segment from the IDF to the classroom or work facility. These terminations are usually modular and snap into special face plates that mount on a standard electrical outlet box. Systems such as the AT&T “M” series of connectors and those manufactured by Allen-Tel, AMP and Seimon are most commonly used.

Topology

Topology refers to a network’s layout. Three network layouts, defining how cables will be run to connect devices, are:

Linear - consists of a single cable that connects one computer to another in a daisy-chain fashion. The ends of the cable are connected to a terminating resistor. Any break in the chain disables all devices connected to the cable. Used in coax cable networks.

Star - cable wires branch from a central point such as a file server or wiring closet. Each device requires its own cable. A break in the cable connecting a single device does not affect other devices connected to the star. Used in twisted-pair networks.

Ring - the network cable loops back to itself and signals travel in a loop or ring.

Wide Area Network (WAN)

A wide area network normally refers to the districtwide or enterprise network of an agency that interconnects several site local area networks. A district’s wide area network would typically include all school site local area networks and the administrative offices in an all-inclusive network.

Millennium

(Continued from Page 5)

IBM said the “time of day clock” on its computer systems can be set to run up to 141 years. Companies could face a time obsolescence problem long after the turn of the century.

The millennium bug is an old dilemma for some U.S. industries such as banks and insurance companies which began dealing with it in the 1970s to cope with amortization (writing off the initial costs of a debt) and interest rate tables.

This article originated from Reuters on May 5, 1996, and appeared in the Los Angeles Times. This article has been reprinted with Reuters permission.

Contributions are now being accepted
for the

Julia E. Gordon Memorial Fund

This is a Scholarship Fund for one of
Julia’s sons, Donald K. Gordon, Jr.
and will be used for
his continuing education.
(Donald has been accepted to M.I.T.,
U.C. Berkeley, Stanford, and Yale)

Checks made out to “JULIA E. GORDON
MEMORIAL FUND” should be sent to:

Julia E. Gordon Memorial Fund
c/o Eric Boutwell,
Information Technologies Dept.
135 Van Ness Avenue, Room 300
San Francisco, CA 94102

Julia E. Gordon started her career in the Information Technologies Department of the San Francisco Unified School District 23 years ago. She began in the Electronic Data Processing Department and progressed upward, excelling in each of the positions she held, to eventually become the District Registrar and Assistant Manager. Her presence will be missed by her many friends and colleagues.

San Marcos

(Continued from Page 4)

In four short hours 35 classrooms were pulled, cut, terminated, wall molding and jacks were installed. The media arrives at 12 and gets lots of wonderful pictures and stories. The district had a photographer video tape the entire day's events. Our sponsors were so overwhelmed that they increased their donation from \$2000 to \$6000. This was a very good thing as the bill for supplies came to \$6281. **IT IS AMAZING HOW MUCH A FEW VOLUNTEERS CAN DO WITH THE RIGHT TEAM LEADERS.**

Looking back, all the frantic frustration, indecision and hassles were well worth it, and I am looking forward to wiring all 9 remaining schools.

These following items will become our NetDay commandments:

1. We will listen to the experts but the final decision will be what is best for San Marcos Unified School District.
2. We will get all financial offers in writing.
3. We will realistically set goals as to how much

can be done in one day.

4. We will shop early and stick with our original design.
5. We will have more fun and maybe word will spread and more people will join in our next NetDay.
6. We will always give the volunteers something to remind them that all their hard work is appreciated. We will also feed them well.
7. We will use the same team leaders over and over. They were awesome.
8. I will think before I say "SURE" to anything.
9. I will always keep my guardian angel with me. My husband says I must have one or else everything would be a disaster.

Kitty Sanchez-Pfeiffer is Director of Technology and Information Systems for San Marcos Unified School District. She may be reached by e-mail at kitty@sdcoe.k12.ca.us.

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