

**ETEC 650**  
**Network Design and Management Project**

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**CVS Network Design Specialists**



**Teachers Designing for Teachers**

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## 1.0 Executive Summary

The networking team members at **CVS Network Design Specialists** would like the opportunity to design and implement a *state of the art* LAN (local area network) and WAN (wide area network) for your new special education office building. It is our understanding that this new office will be staffed by a director, six curriculum specialists, one office manager, and one support staff employee. The director and the curriculum specialists will spend a considerable amount of time working outside of the office location, both within and outside of the surrounding metropolitan area. It is further understood that the applications software environment will be installed by another service provider after initial network installation is completed. Additionally, the office manager will serve as the IT coordinator for the office and, in that capacity will act as the network administrator on an on-going basis. We understand that a key issue in information technology for this organization is mobility and have provided a workable solution for handling mobility needs. The floor plan included will provide specifics on the physical configuration for this office. Our specialists take pride in designing this quality environment to meets your needs at a cost of \$38,881.16, which remains well within your \$45,000 budget. We look forward to the opportunity to serve you.

## 2.0 Design

**A. Design Information Narrative** (See End-User provisions [2.1], Hardware [2.2], Software [2.3], and Services [2.4] listed below) for details.

### 2.1 End-User Provisions

A. Each person in the office will be provided with an Acer Aspire AST690 19" wide screen desktop with Intel Pentium D Processor 925 in his/her work area. Windows Vista Operating System will be preinstalled.

B. The Director and the six curriculum specialists will be provided with Toshiba Tecra A8-E28511X laptop microcomputers which support wireless activity. Wireless access will be provided by Belkin 802.11g wireless Cable/DSL Gateway Router. Windows XP Pro Operating System will be preinstalled.

C. To ensure that the LAN file server is available at all times, other than regularly scheduled backups, a Belkin Battery Back-Up with Tower or Horizontal Form Factor with USB 1000 VA will be used.

## 2.2 Hardware

A. The computers will be client server networked using a Star Topology configuration on a 100 Base T Ethernet application. Approximately 1500 feet of Cat 5e unshielded twisted pair (UTP) cable, 50 RJ-45 terminator connectors, 15 surface mount boxes with 2 ports each and 2 surface mount boxes with 4 ports each will be provided. The network communications equipment will consist of DLink WebSmart DGS- 1224T 24 port 10/100/1000 Gigabit Switch with 2 Combo SPF slots.

B. Network File and Back Up Server hardware shall consist of a Dell Power Edge 1900 Quad Core Intel Xeon E5310, 2x 4MB Cache, 1.60GHz, 1066MHz FSB, Windows server 2003 R2, Enterprise Edition with SP2, including 25 CALS.

C. NETGEAR FVS 318 Cable/DSL VPN Firewall will be used for the point of connection to the Internet Service Provider.

D. File server with back up PowerVault 100T, DAT72 Tape Backup, 36/72GB, w/Controller, using Symantec Backup Exec v11d Server Suite backup tape software will be used.

E. Desk Top Computers (see item A. in 2.1 end-user provision section)

F. Laptop Computers (see item B. in 2.1 end-user provision section)

G. Uninterruptible power supply for the file server will be a Belkin Battery Back-Up with Tower or Horizontal Form Factor with USB 1000 VA.

H. Two (2) docking stations will provide connectivity for the laptops used in the office. The docking stations will be Toshiba Advanced Replicator III Plus.

I. Two (2) Ricoh black laser printers which support 22 ppm output capacity will be connected to the network.

J. One (1) Lexmark C532N color printer with up to 22ppm will be provided.

K. One (1) Toshiba TD-S35U LCD projector and one (1) 84 x 84 inch Apollo display screen will be provided for use in the conference room.

L. Ativa-7 Outlet Surge Protection with six foot cord and Telephone Protection will be used as power surge protection and will be provided for desktop computers, server, printers, and switch connected to the network. Ativa offers a lifetime \$100,000 connected equipment warranty.

## **2.3 Software**

A. Windows Server 2003 R2, Enterprise Edition with SP2 NOS Software will be used for the network file server.

B. Windows Vista Operating System preinstalled with Active Directory (server 2003 NOS compatible) client operating systems will be provided for all desktop computers and Windows XP Pro Operating System will be preinstalled on the laptop computers.

C. Microsoft Office Standard 2007 (Word, Excel, PowerPoint, Outlook) will be provided for all desktop and laptop computers. Email software will be Microsoft Outlook 2007.

D. Norton Symantic Antivirus 2007 three user Edition will be used as an additional firewall and antivirus protection on desktop and laptop computers.

E. Symantec Backup Exec v11d Server Suite will be used for network management software; a 3Yr. Gold Enterprise support: 7x24 HW/SW Escalation Mgmt, 4 hr 7x24 onsite service will be available as well as an Asset Recovery Value Recovery Program Managed Logistics Service Supporting network configuration, monitoring, and troubleshooting.

## **2.4 Services**

A. The LAN will be provided with a dedicated DSL connection to the Internet provided by Charter Business Custom Hosting.

B. Internet Connectivity will be Fast Access DSL provided through Charter Business.

C. Wireless connectivity within the office complex (WAP) for the Director and each of the specialists will be provided by a Belkin 802.11g wireless Cable/DSL Gateway Router.

D. A remotely hosted website that meets the capacity and transfer needs of a small district office is included in the Charter Custom Hosting Package price from Charter.

E. Comprehensive back up facilities for the file server and the desktop computers connected to the network will be provided by Charter Business Custom Hosting, along with as a tape backup system created by Symantec Backup Exec v11d Server Suite and stored offsite at a nearby sister school.

## **2.5 Financial**

A. Start up costs, one year website hosting, leased services, Internet service provision, wireless connectivity, and backup resources are included as part of the Charter Custom Hosting Package, which will be \$4,319.40 per year. CVS will provide year one costs. Additional monthly services can be purchased directly from Charter at a cost of \$359.95 per month.

B. CVS will also provide 100 backup tapes for year one, in addition to the five pack of backup tapes that come with the server.

C. There is no leased equipment.

## **3.0 Design Information**

A. See enclosed network map on final page of proposal. The product table is located in the Appendix on pages 9 to 13.

## **4.0 Mobility**

A. The need for mobility of clients **within** the office has been addressed through the use of two laptop docking stations. The staff will have seven laptops with wireless Internet capability available for use within and outside of the office.

## 5.0 Security

A. Network **security within the office** will be provided using NETGEAR SVS328 Cable/DSL Prosafe VPN Firewall for emailing, downloading files, and surfing the web. Desktop computers and file backup server will be **protected online** with Norton Symantic Antivirus 2007 Firewall Software.

B. **Security for remote connections** will be provided through the use of Norton Symantic Antivirus 2007 (Firewall) Software which will be installed on each of the laptops.

C. To provide against data loss, hardware damage, and downtime due to **unexpected interruption of power**, an Uninterruptible Power Supply (UPS) Belkin Battery Backup with Power for Horizontal Form Factor with USB 1000 VA will be used.

## 6.0 Implementation

### A. Installation Time Table

Week	Installation Activities
1-2	Order, unpack, inspect, and set up all hardware including docking station hardware, LCD projector, and screen
3-4	Measure, create, install, bundle, tag, and connect cables to hub
5	Install surface wall mounts; Connect all cables to hardware
6	Connect router to hub, File and Backup Server and ISP
7-8	Test all hardware, cable connections, troubleshoot
9	Install and test all software, troubleshoot; Set timing for automated backup media, test, troubleshoot

## **B. Proposed Back-Up Strategy**

### **6.1 Who is responsible for the back-up process?**

The office manager will serve as the IT coordinator for the office, and in that capacity, will act as the network administrator on an on-going basis. Part of the manager's responsibilities will be system back up for the servers. Curriculum specialists and office personnel will be responsible for backing up files on the hard drives of their own machines.

### **6.2 How will the back-ups be accomplished (type of back-up facility)?**

Back-ups will be accomplished using a file server with back-up PowerVault 100T, DAT72 Tape Backup, 36/72GB, w/Controller, using Symantec Backup Exec v11d Server Suite backup tape software.

### **6.3 What information is to be backed-up? (file servers, desktop computers, laptops)**

Information on the school servers will be backed-up. Information on staff computers will also be backed-up. Staff computers will include desktop and laptop machines.

### **6.4 When are the back-ups to be performed?**

Server back-ups will be scheduled for Friday afternoons. On holidays, the back-up will occur at the end of the school day before the holidays begin. Curriculum Specialists and office personnel are responsible for performing their own back-ups in a timely manner. There will be data backup on a nightly basis via Charter Business Custom Hosting during off hours.

### **6.5 Where are the back-ups to be maintained?**

Completed back-up tapes are to be stored offsite at a nearby school in the parish. Encrypted data will be stored in the vaults of Charter.

### **6.6 What is the rationale for the selection of the proposed back-up strategy?**

Tapes will be stored at a nearby school for confidentiality and protection of records. The information will be placed in a secure location that is easily accessed by the office manager. Charter backup provides a simple interface to retrieve stored data.



## 6.7 How long are back-up media to be archived (rotation scheme)?

Back-up media are to be archived and rotated every 10 years.

## 7.0 Project Summary

A. The teachers at **CVS Network Design Specialists** feel that we have successfully completed this network project by designing, planning, budgeting for, and implementing a secure network with *state of the art* features for the given special education building within budgetary guidelines.

### B. Reflections

#### 1. Cindy Collins:

What a learning experience! Undertaking the task of the Network Design and Management Project was quite intimidating, but also exciting. My knowledge in the area of networking was limited to what I learned in class so I was very fortunate to have wonderful team members who each shared a different perspective of networking. As we worked through the information we gathered for the project, I realized how much more I needed to learn about setting up a network and felt fortunate that my team members were so willing to share their knowledge and expertise so that I would have a better understanding of actual networking designs and practices. Vicki's organizational skills helped to keep the project on track so that we could tackle the parts and not be overwhelmed by the whole, and Sharon's expertise from having actually worked in the technology environment was priceless. I learned a great deal from my team members as we discussed the different aspects of the project and worked together to come up with the most beneficial and economical design. Completing projects like this one is valuable to me because it helps to reinforce the information learned in class and puts things into a realistic, work-based perspective. I now have a better understanding of how networks are designed and have a greater appreciation for those who actually work in the networking field. If given a similar task in the future, I would like to again have the opportunity to interact with team members of this caliber as I thought this approach was most beneficial.

#### 2. Vicki Martinez:

The concept of this project was initially a very daunting prospect. The scope of material to be researched and the level of understanding needed to bring the project to completion caused concern. Working as part of a team was, in my opinion, a close simulation of real world experiences and served to decrease the amount of

stress that would normally accrue from working alone. Team members volunteered for responsibilities according to talent, interest, and experience. Because all members of the Cinvicshar Team were cooperative, hard working, and determined to provide a quality project, the process became less stress related, although not stress free, and more learning related. We asked each other lots of questions, tossed ideas back and forth, and when in total doubt, did a Wikipedia search for answers. Servers, back up tapes, and types of software, as an example, took on new meaning and understanding as research was done to determine the best buy for the price and the job. Doing comparative shopping on different websites gave insights which were used to develop new favorite places to shop. By combing through details and customizing equipment, it was possible to gain new information about the workings of the machines, the wires, and the network. I now have a more refined perspective on technology coordinators and their job responsibilities. Although I am currently far from being an expert, I am learning what questions to ask and where to find the answers. As a result, I've come to the conclusion that informed principals should have a background in networking in order to be effective school managers. James Madison had it right when he said "Knowledge is power..."












### **3. Sharon Slavinsky:**

In the beginning I felt a bit overwhelmed at the vastness of this project. Our team was insecure and doubtful that we had the acquired knowledge necessary to begin, nor less complete, such a major undertaking. I must say that as the project began to develop and issues were discussed amongst the group, we "became" a true business and began to rely on the prior knowledge and skills that we each use to survive in our daily lives. I am so blessed to have had the opportunity to work with Vicki Martinez's awesome skills of organization! She has a gift above and beyond for organizing her thoughts and creating a clear and concise outline from which a team could work. Once she masterminded the outline we worked to gather the information that would be necessary to accomplish our goal. Cindy was a true angel when it came to understanding contracts and grants. With her ability as a technical editor, we had the gift of being able to create our vision and then have her step up and fine tune the project. I contributed my part through the eyes of a prior special education teacher and current technology teacher, as well as researching and identifying the technical aspects of the project. To say this was an eye opening experience would be an understatement, I loved working on the project with my teammates and found myself dedicating huge portions of time vamping and revamping ideas as we tossed out possibilities and created scenarios in which problems could arise or adjusting our thoughts as new




information was uncovered. I continue to be amazed at the vast amount of information that can be learned merely by attempting to tackle a project that at first seems to be impossible!





## 8.0 Appendix

Item Description	Item Number/Vendor -Manufacturer	Quantity	Unit Price	Total	Picture
Toshiba Laptop	Tecra A8-EZ8511x Toshiba	7	699.99	4899.93	
Toshiba 3 year System Guard & 2 <sup>nd</sup> /3 <sup>rd</sup> year Extended Service Plan	WSN-PEGQ3V Toshiba	7	269.10	1883.70	
Advanced Port Replicator III Plus (Docking Station)	PA3474U-1PRP Toshiba.	2	179.99	359.98	
Notebook Memory Module (1GB PC2-4200 DDR2-533 Mhz)	PA3411U-2M1G Toshiba	7	139.49	976.43	
Belkin 802.11 11g Wireless Cable/DSL Gateway Router	F5D7230-4 Toshiba	1	39.99	39.99	
Microsoft Office Standard 2007	Microsoft Office Microsoft Online	16	399.99	6399.84	
5 pocket Ballistic Nylon Carrying Case	PA1389U-INCS Toshiba	7	59.99	419.93	
Toshiba TDP-S35U Projector	TDP-S35U Toshiba	1	599.00	599.00	
Lexmark C532N Work Group Color Laser Printer - up to 22ppm	639620 Office Depot	1	499.99	499.99	
Richo BP20N Monochrome Laser Printer	968105 Office Depot	2	349.99	699.98	

Apollo Wall Screen 84" x 84"	427699 Office Depot	1	259.99	259.99	
Belkin Battery Backup UPS With Tower or Horizontal Form Factor With USB 1000 VA	324602 Office Depot	1	133.99	133.99	
Ativa 7 outlet Surge Protector With 6' cord and Telephone Protection	958893 Office Depot	14	19.99	279.86	
Dlink Web Smart DGS-1224T 24 port 10/100/1000 Gigabit Switch with 2 Combo SPF slots	852934 Office Depot	1	320.99	320.99	
NETGEAR FVS328 Cable/DSL Prosafe VPN Firewall	275469 Office Depot	1	106.95	106.95	
Acer Aspire AST690 desktop PC with Intel Pentium D Processor 925	AST 690 Walmart	9	598.00	5382.00	
Symantic Norton Antivirus 2007-3 User Addition	853487 Office Depot	6	69.99	419.94	
Dell Power Edge 1900 -Quad Core Intel® Xeon® E5310, 2x4MB Cache, 1.60GHz, 1066MHz FSB (server)	19C16 Dell	1		Final package total at end of package list	
Windows Server® 2003 R2, Enterprise Edition with SP2, Includes 25 CALs (operating system)	3R23EE Dell	1			
Quad Core Intel® Xeon® E5310, 2x4MB Cache, 1.60GHz, 1066MHz FSB (additional processors)	2PC16 Dell	1			
4GB 667MHz (4x1GB), Dual Ranked Fully Buffered DIMMs (Memory)	4G4D6D Dell	1			

Keyboard, USB	USBK4 Dell	1			
Dell E177FP, Flat Panel, 17.0 Inch Viewable Image Size (monitor)	17LCD Dell	1			
Broadcom TCP/IP Offload Engine Enabled, Microsoft OS Only	TOEKEY Dell	1			
80GB 7.2K RPM Serial ATA 3Gbps 3.5-in Cabled Hard Drive (Primary Hard Drive)	80S2 Dell	1			
Sas5/iR, PCI-Express, Add-In RAID Card (Primary Controller)	SAS5IR Dell	1			
No Floppy Drive (Floppy drive)	NOFD Dell	0			
Optical Two-Button Mouse, USB	USBOPT Dell	1			
Single Embedded Broadcom NetXtreme II 5708 Gigabit Ethernet NIC	OBNIC Dell	1			
56K Internal Modem for Power Edge & Power EdgeSC, Conexant (Modem)	INMODM Dell	1			
PowerVault 10T, DAT72 Tape Backup, 36/72GB, w/Controller, Internal (Removable Disk and Tape Drives)	DAT72C Dell	1			
48X IDE CD-RW/DVD ROM DRIVE (CD/DVD Drive)	DAT72C Dell	1			
Electronic Documentation & OpenManage CD Kit (Documentation)	EDOCS Dell	1			Picture Not Available

80 GB 7.2K RPM Serial ATA 3 Gbps 3.5 in Cabled Hard Driver  (2 <sup>nd</sup> hard drive)	80S2 Dell	1			
PERC 4e/DC, PCI- Express, 128 MB Cache, 2 External Channels  (2 <sup>nd</sup> Controller)	P4EX2E Dell	1			
Symantec Backup EXEC v11d Server Suite (Tape Back Up Software)	SBESRVR Dell	1			
Add-in SAS/SATA RAID 1, SAS 5/iR Adapter	ASR1C Dell	1			
3 YR Gold Enterprise Support: 7x24 HW/SW, Escalation Mgmt, 4hr 7x24 Onsite  (hardware support services)	GOLD4U Dell	1			
No Installation Assessment  (Installation Support Services)	NOINSTL Dell	0			No Picture Available
Open Mng Subscription Svc (8 ed) (Open Management Subscription)	OMSUB8 Dell	1			No Picture Available
DAT72, Tape media cartridge, 36/72GB, 5PK  (Media for Removable Disk (RD 1000) and Tape Backup)	5PKDAT7 Dell	1			No Picture Available
Dell Remote Access Card, 5 <sup>th</sup> Generation for PowerEdge Remote Management	DRAC5 Dell	1		Package Total \$9,847.03	
Value Recover, Program Managed Remote Managed Logistics	Dell Part # 960-1848 Dell	1	45.45	45.45	No Picture Available
Dell 20/40 GB DDS-4 Tape Cartridge – 100 pack	00001 Dell	1	559.00	559.00	

1000 ft. Cat 5E 350 MHz solid PVC CMR Cable- Gray/ Cat 5e, 350 MHz CMR rated cable; 1000 ft pull box	Sku 27352 Cables To Go	2	119.99	239.98	
Cat 5e surface Mt Box – 2 port- ivory	03836 Cables To Go	15	7.99	119.85	
RJ45 Cat 5 modular plug for round stranded cable – 50 pk.	Sku 11380 Cables To Go	2	27.99	55.98	
Snap in surface mount box 4-port - white	Sku:03842 Cables To Go	2	5.99	11.98	
<p><b>Note: no tax is charged due to state non-profit status.</b>  <b>Note: all prices include shipping and handling.</b></p>					
<b>Total Product Price</b>				<b>\$34,561.76</b>	