In addition to increasing the backbone bandwidth, additional loops increase the redundancy of the backbone network such that it can tolerate the loss of an individual link on each of the original and the additional loops, without losing contact with any site in the network.

Hub Location Methodology

The network design presented in this document demonstrates WinStar's ability to provide service not only in the downtown areas of a city, but also in the outlying areas. This gives a sense of WinStar's ability to scale the densest concentration of high-rise buildings, and to provide an expanded reach into the geographic periphery as well.

The following pages illustrate WinStar's hub site selection process with applicable building locations plotted on maps of the DC area and presented graphically. A detailed list identifying the location of potential WinStar hubs is included in tabular form in the appendix to this document. The table and maps represent a network that incorporates WinStar's 38GHz radio connectivity from WinStar Hub sites to target School System locations. These maps have been generated using the actual data set of the DC School,System's requested sites and WinStar Hub sites that have been carefully selected to provide connectivity and coverage.

School sites and potential WinStar hub sites are depicted and plotted through a geocoding process utilizing MapInfo software. For this proposal, the buildings and microwave links shown are based on an actual Line of Sight Survey conducted in Washington DC specifically for the DC School System. **Building owners have not been contacted and roof rights for antenna location have not been obtained, so the hub sites shown are tentative locations and WinStar reserves the right to modify hubs and associated school clusters as necessary.**

Two maps are included in the following pages. Figure 8 is an overview of the District of Columbia showing all of the DC Public School System sites and potential WinStar hub locations. Figure 4.9 shows the pilot network, complete with both School System server sites, four potential WinStar hub sites, the backbone fiber ring and the 27 corresponding school sites.

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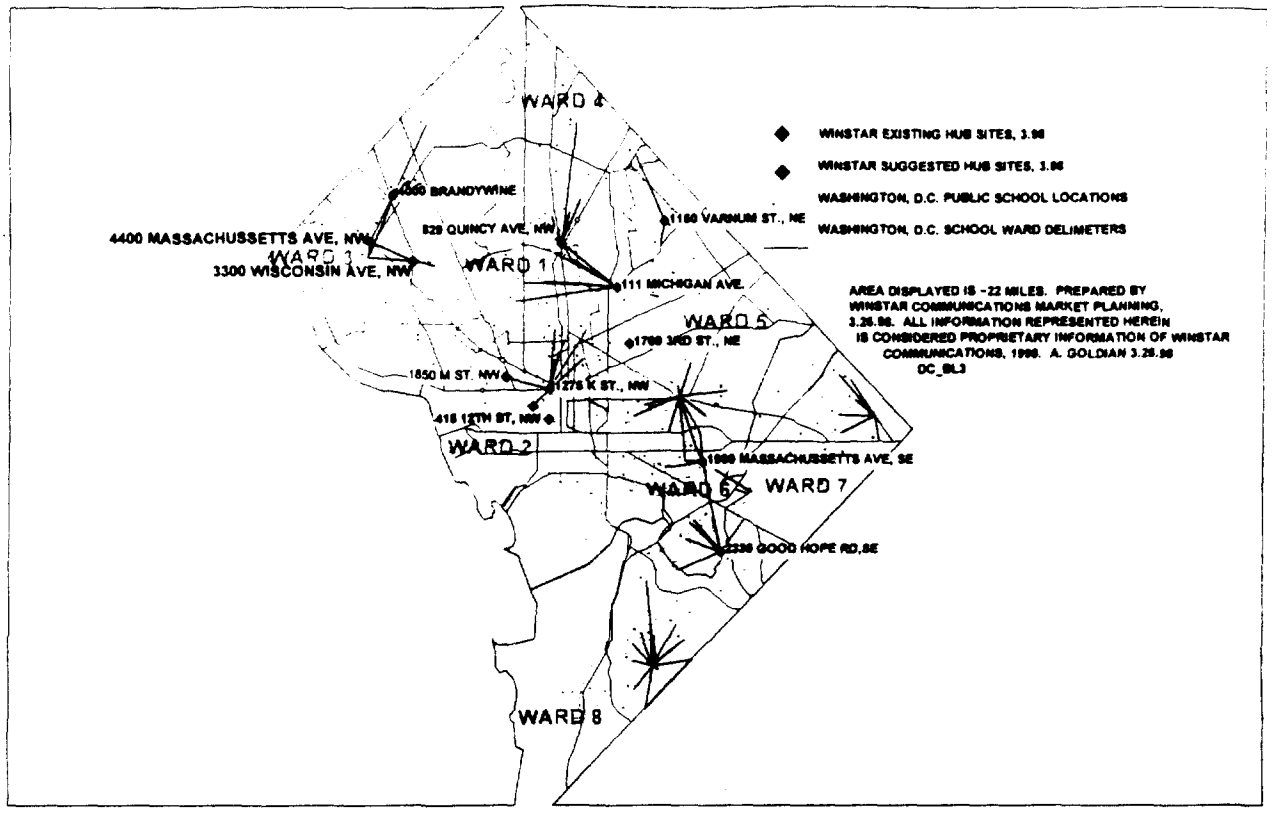

Figure 8

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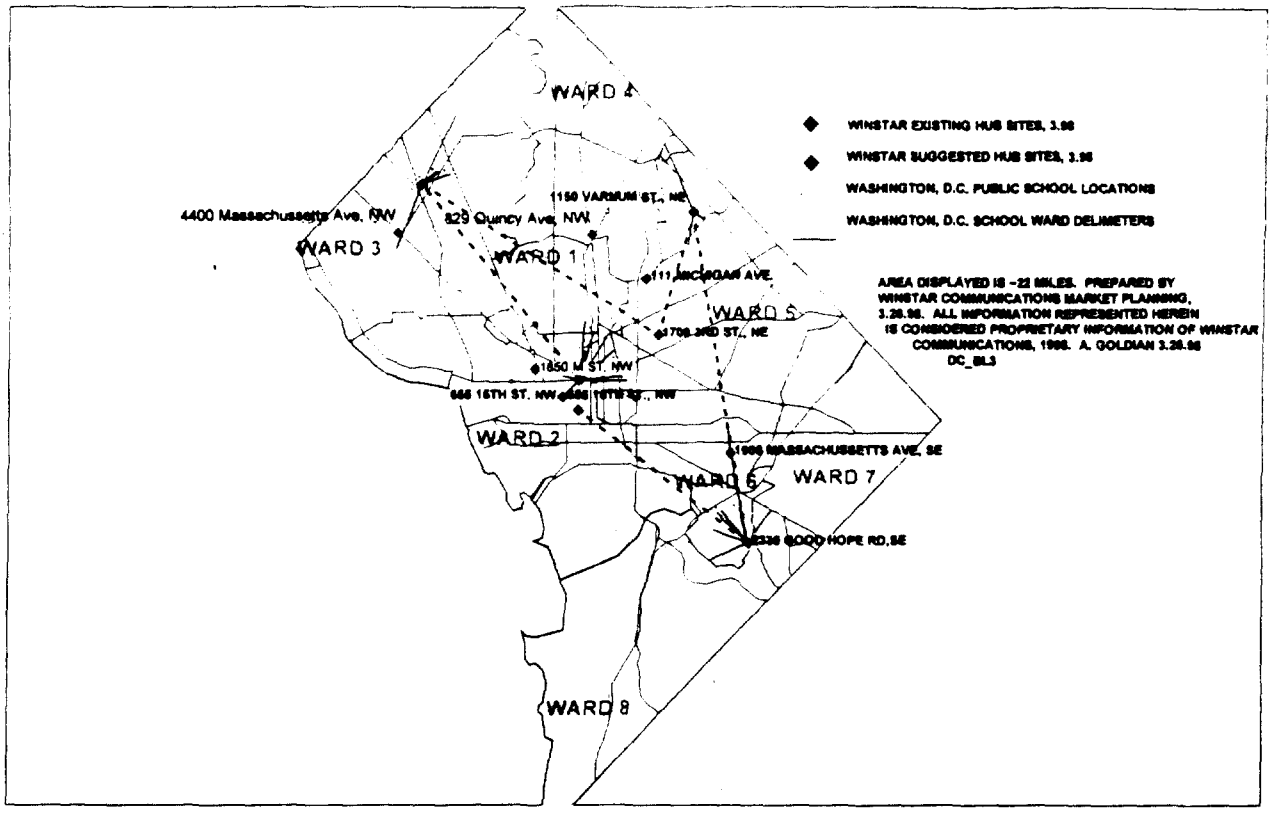

Figure 9

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Network Management

Each "Wireless Fiber" and optical fiber link in the proposed network can be monitored and controlled remotely. Alarms for both major and minor incidents, environmental conditions and operational statistics can be collected and reported to one or more central locations.

WinStar maintains a Network Operating Center in Vienna, Virginia specifically for this purpose, but the alarms and statistical information can be shared with the DC Public School System, or their designated representative.

The following major Network Management functionality can be provided:

- Monitor both indoor and rooftop equipment status at both hubs and remote sites
- Sense and report the occurrence of alarms at hubs or remote sites
- Monitor and report on power status
- Monitor and report on environmental conditions
- Provide periodic "heartbeat" information

WinStar understands from its conversations with IBM Global Services that IGS would has proposed providing the enterprise network management layer. WinStar's backbone network management will work cooperatively with IGS' enterprise level.

ITFS Expansion

Proposed ITFS Expansion

Winstar's proposal includes responsibility for installation and maintenance of an expanded ITFS system for DCPS. Winstar will perform line-of-sight survey and install all necessary headend transmitters and related equipment, modulators/demodulators, scramblers, waveguides, antennas and antenna lines. Subject to the availability of reasonable terms and conditions, we will procure tower leases and do the requisite engineering and site preparation. Receiving equipment, including receivers and set-top boxes will be installed at 73 locations. Each of 1726 classrooms (located, in varying numbers, at the 73 designated locations) will be fitted with one wall-mounted 27-inch television set. Classroom hookups will be completed from existing distribution wiring, including all necessary hardware.[1] Winstar will also be responsible for specified maintenance, including

[1] The WinStar bid assumes that no special asbestos abatement procedures are required. In the event of the necessity of conducting installation under asbestos abatement standards, additional costs must be negotiated.

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emergency restoral of service, for one year from complete installation. Winstar will assist DCPS with respect to any warranty repairs which become necessary for purchased equipment but cannot independently warrant that electronics will work as advertised by manufacturers.

The proposal assumes that the DCPS has a license for, or has leased the rights to, a total of 20 ITFS channels which are available under applicable FCC regulations for the intended purpose. Winstar will not be responsible for any contractual limitations which exist with respect to the use of the ITFS channels. If it is necessary to apply for ITFS authorizations Winstar will undertake to do so at additional cost, as set forth on the next page. The proposal assumes a suitable tower site is available from which all 73 receive sites can be served. While Winstar anticipates this will be the case, it cannot guarantee it at this time. The proposal does not include any costs associated with bringing signals to the transmitter site; these will be the responsibility of DCPS.

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Costs:

1	Total equipment site engineering, as described above: [2]	$1,200,000
2.	Receiver installations: 73 sites at $400 each:[3]	29,200
3.	Classroom installation (27-inch JVC/Panasonic TVs, wall mounted utilizing Brentford DSML27R-BK security lock mounts, plus associated wiring and hardware): 1726 classrooms at $2,159.32 each:[4]	3,726,993
	Total	$4,956,193

All the foregoing costs are for installation of an analogue system. If DCPS prefers a digital system the costs for items 1 and 2 would be approximately 35% higher.

---

[2] (A) Assuming availability of a suitable site and space on the tower. (B) If new or amended ITFS application have to be filed the cost will rise by $7000. (C) If access to existing licensed channels must be negotiated the cost will rise by $5000.

[3] Assuming normal installation and that each site is prewired so that only minor additional wiring will be required.

[4] The DCPS outline specifies 1726 classrooms, each with one wall mounted television receiver. The Network description lists 3718 classroom installs but does not specify the number of receivers in each room. Winstar's proposal is based on the 1726 classroom number. If the larger number of classrooms (3718) is the specification, however, the cost would be proportionately higher.

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Premise Equipment and Wiring Upgrade

WinStar understands that the premise equipment and wiring upgrade is covered under the IBM Global Services proposal.

Internet Access

WinStar is proposing a 45 Mbps Internet connection for DCPS. The Internet connection would be directly into the proposed bi-directional OC3 ATM backbone. The connection would be made via the 1275 K Street Hub site, and provide Internet access for the entire DCPS network.

The Internet access will be provided via WinStar GoodNet, a wholly owned subsidiary of WinStar Communications, Inc. WinStar GoodNet is a first tier Internet service provider with a national ATM backbone. WinStar GoodNet Internet offers one of the fastest and most reliable Internet configurations available. Our national ATM backbone is pictured below.

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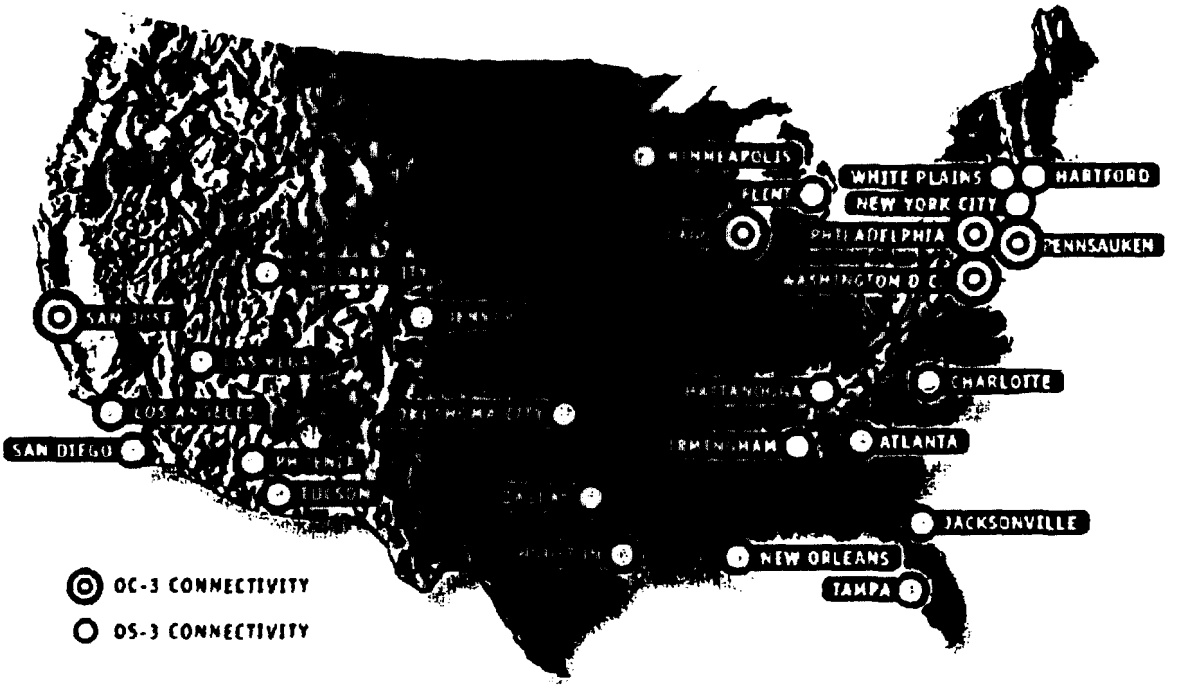
WinStar GoodNet's National ATM Backbone



Why ATM?

ATM technology is emerging as the primary networking technology. The advantages rest upon the fact that ATM protocols provide a homogeneous network for all types of traffic -- regardless of whether the application is carrying voice, video or data. Hence, the term "asynchronous." Traditional router-based technology relies on current time-division multiplexing that requires a fixed data-rate for each channel. What this means to you is that with ATM, Winstar-GoodNet offers the flexibility and quality of service that is unavailable with router-based topology.

Unlike the traditional router-based networks, ATM network technology takes a direct path to its final destination. This allows companies secure, reliable, and efficient service for all voice, video, and data information. Additionally, ATM network technology offers companies substantial time and cost savings which can translate into a competitive advantage.

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High-speed Access

The WinStar GoodNet backbone is connected directly to multiple Network Access Points (NAPs) including the MAE-East, MAE-West, and the Sprint/New York NAP. Plus over 100 private peering arrangements already in place.

ATM Network

WinStar GoodNet's ATM Backbone is designed to transfer mission critical data from one computer site to another in the most efficient way possible through the use of high-speed circuits. Winstar-GoodNet engineers selected Asynchronous Transfer Mode (ATM) for delivery of Internet Protocol (IP) traffic because of its inherent reliability and its impressive ability to adapt bandwidth usage for maximum efficiency.

24-hour Monitoring

WinStar GoodNet maintains a centralized Network Operations Center (NOC) in Phoenix, Arizona, that operates 24X7 and fully complies with International CCITT and National ANSI standards. Our NOC engineers are constantly monitoring the throughput of your systems to identify usage and have developed a complete software and hardware solution to remotely detect, troubleshoot, and eliminate network problems often before customers even realize they exist. In addition, we are able to compile critical statistics that can be used to plan ahead for further customer demands and prevent wasteful usage or information bottlenecks. This dedication translates into minimal downtime and increased reliability for your mission critical information. WinStar GoodNet demonstrates the highest level of performance by proactively researching, developing, and deploying new technology at a pace that makes us one of the premiere connectivity providers in the world.

Winstar's Dedicated Access: is *not shared* access. It is also quite different from traditional point to point connections. Instead of terminating your circuit into a router at our POP, Winstar utilizes an ATM switch. As a result Winstar will provide you with guaranteed bandwidth between your site and Winstar's POP. This connection is monitored and maintained completely by Winstar.

Wireless Fiber Leased Line Internet Service from WinStar-GoodNet, available at bandwidth segments of 56K, 128K, 256K, 512K, full T1, and T3 provides customers with a private, point-to-point Internet connection of the highest quality. This service offers your organization a dedicated LAN connection directly to WinStar-GoodNet's high-speed Internet network.

WinStar-Wireless Leased Line pricing is available at flat rates. Pricing is based upon your location and the available Local Service Provider connection options from your site to the nearest WinStar-GoodNet point of presence (POP). WinStar-GoodNet's POPs are located strategically throughout the United States and are directly connected to the national, T3 and OC3 ATM Internet network.

Winstar Wireless Internet connection provides you ***Route Diversity*** for mission critical traffic, it makes sense to implement diverse backup facilities to insure that mission-critical traffic is always

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up and running. With WinStar Private Line, traffic is carried on completely different network facilities. Since WinStar uses wireless technology, customers don't need to worry about construction crews digging up cables and damaging the Regional Bell Operating Company's phone line.

How does Wireless Fiber Work:

WinStar Wireless Private Line uses WinStar Wireless Fiber℠ to provide customers with point-to-point DS-1 (1.544 Mbps) or DS-3 (45 Mbps) connectivity for internet traffic. WinStar uses 38 Ghz digital microwave to connect customer locations with a WinStar hub site.

WinStar passed a number of rigorous technology trials conducted by the largest telecommunications companies in the U.S. WinStar proved that its Wireless Fiber℠ service is the functional equivalent of fiber in both performance and reliability standards. It delivered:

* 10-13 bit error rate (unfaded)

* 99.999% availability

System Requirements:

CSU/DSU

Network router

Computer network or server

TCP/IP network software

Diagram of Wireless Fiber℠ Internet Connection

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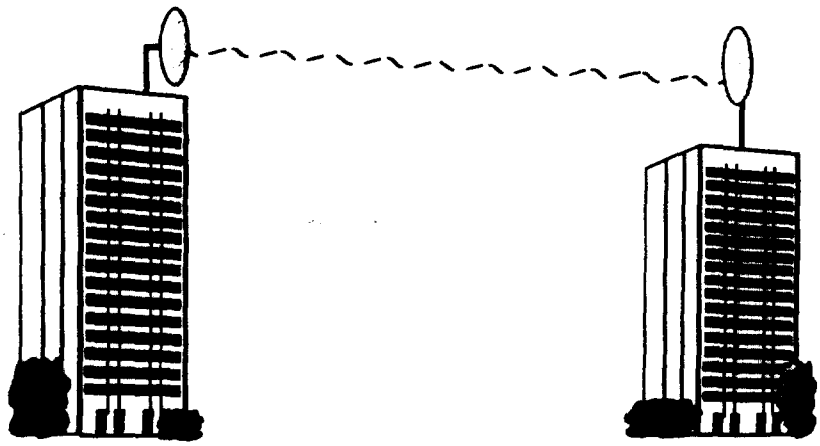
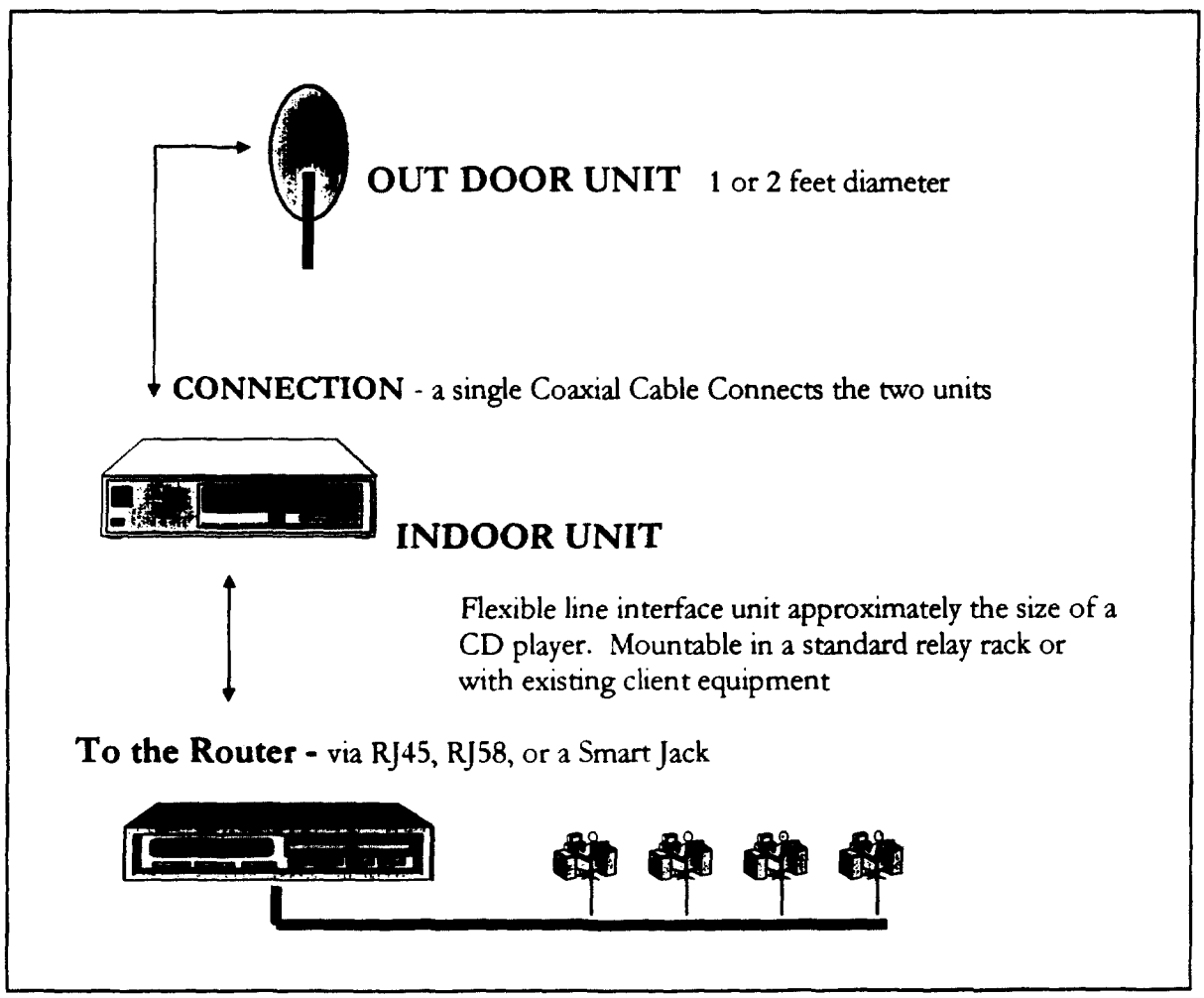


WinStar
1850 M St NW

DCPS Hub Site
1275 K St NW

What happens inside the building?



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Educational Software and Content

As part of the services specified in this proposal, WinStar for Education, a wholly owned subsidiary of WinStar Communications, Inc., will provide, **free of charge** to DCPS, **a suite of educational** applications and content programs. Programs that will enable DCPS to integrate Internet technology into the educational process as a tool to obtain the objectives outlined in DCPS strategy.

Many of our programs are Web-based collaborations, helping students to learn how to participate effectively as group members. They help students to become fluent in the use of information technology and search for intelligence in information, and, in turn, produce a quality product for the world to view online. Our Web-based technology enables students to self-actualize, providing an additional motivation for independent study.

The following tools and content programs will be provided:

LivingPage™

The LivingPage™ is a Web-based program that allows teachers and/or students to create an online set of communal bookmarks or favorites that can function as an electronic library, reference set or bibliography for Web-based activities.

Like all WinStar for Education programs, its point-and-click interface allows teachers and students to focus on the educational objectives and not have to learn HTML or complex programming languages. With all WinStar for Education applications we strive to make the technology transparent to the educator. The only requirement is to have a working knowledge of either the Microsoft Internet Explorer or Netscape Navigator browser.

NewsNow™

NewsNow™ is a Web-based program that enables teachers and/or students to publish an online electronic newspaper. This newspaper can have multiple sections, with different permission levels allowing different administrators, educators and/or students to publish and/or read the online newspaper.

Using NewsNow™ DCPS will be able to generate district wide, school specific, classroom specific and even project specific online newspaper or newsletters. In each and every case, someone identified as the administrator will have the ability to determine the different levels of read/write permissions to ensure a quality product.

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NewsNow™ provides a powerful motivator for the children. When children see their own words in print on the World-Wide-Web, right next to those of national newspapers, NASA and the Smithsonian, it provides a sense of self-actualization that motivates them to achieve even more.

Like all WinStar for Education programs, LivingPage's™ point-and-click interface allows teachers and students to focus on the educational objectives and not have to learn HTML or complex programming languages. With all WinStar for Education applications we strive to make the technology transparent to the educator. The only requirement is to have a working knowledge of either the Microsoft Internet Explorer or Netscape Navigator browser.

WebBoard™

The WebBoard™ is a hypertext computer conferencing tool. WebBoard™ enables educators and students to create online forums in which thought-provoking questions can be posted and discussions developed. The WebBoard™ uses familiar metaphors, such as the indented outline, to enable participants to organize their discussions in a logical online hypertext document.

This program is being used today by schools and organizations around the globe. In New York State, the Commissioner of Education is using the WebBoard™ to conduct brainstorming sessions with district superintendents on critical issues facing education. As part of the Tidal Passages™ program, it is used by schools from over twelve nations world-wide. Within the MindsEye Monster Exchange™, participating teachers are using it to form an online self-help network.

Like all WinStar for Education programs, the WebBoard's™ point-and-click interface allows teachers and students to focus on the educational objectives and not have to learn HTML or complex programming languages. With all WinStar for Education applications we strive to make the technology transparent to the educator. The only requirement is to have a working knowledge of either the Microsoft Internet Explorer or Netscape Navigator browser.

MindsEye Monster Exchange™

MindsEye Monster Exchange™ is a Web-based collaborative experience that focuses on reading, writing, and communication. It also uses art and technology to draw the students into the process, providing an experience that makes learning fun.

Children from participating classes use the collaborative exercise of designing, describing and recreating monsters to sharpen their skills in descriptive writing and critical reading. Along the way they also learn how complex communicating can be. They develop an appreciation for cultural differences and the many ways in which we all interpret the information that we receive in our world.

The MindsEye Monster Exchange™ is already in use by thousands of students around the world. We set an objective to make the technology so transparent that a single teacher could run a very large collaboration during the normal school year. We have succeeded. Using our tools a middle

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school teacher is today running a collaborative MindsEye Monster Exchange™ that involves over two hundred classrooms around the globe.

Like all WinStar for Education programs, MindsEye Monster Exchange's™ point-and-click interface allows teachers and students to focus on the educational objectives and not have to learn HTML or complex programming languages. With all WinStar for Education applications we strive to make the technology transparent to the educator. The only requirement is to have a working knowledge of either the Microsoft Internet Explorer or Netscape Navigator browser.

Insect Ecology Exchange™

Based upon the proven concepts behind MindsEye Monster Exchange™, Insect Ecology Exchange™ creates a collaborative environment in which children learn about, design and exchange ecosystems and the insects that might thrive in them. Children design and describe ecosystems that they exchange with their partners. The partners then design, describe, classify and draw pictures of insects that would thrive in the imaginary ecosystems. In the process they exercise basic reading, writing, and communication skills, while being exposed to children from around the world.

This program has been used at multiple grade levels. The rigor with which the students are required to understand the ecosystems and classify the insect life forms is varied by grade level.

Fish-n-Chips Exchange™

Based upon the proven concepts behind MindsEye Monster Exchange™, Fish-n-Chips Exchange™ creates a collaborative environment in which children learn about, design and exchange ecosystems and the marine life that might thrive in them. Children design and describe ecosystems that they exchange with their partners. The partners then design, describe, classify and draw pictures of marine life that would thrive in the imaginary ecosystems. In the process they exercise basic reading, writing, and communication skills, while being exposed to children from around the world.

Fish-n-Chips Exchange™ is also part of our award winning Tidal Passages™ program. As part of Tidal Passages™ Fish-n-Chips Exchange™ is being used to help children understand the marine life of the South Pacific.

Again, the rigor with which the students are required to understand the ecosystems and classify the marine life forms is varied by grade level.

The Journey Exchange™

WinStar for Education has found that many children, both in the inner cities and rural areas, have become prisoners of their poverty. They do not have the means to travel to far away places. They are missing the multicultural experiences that are afforded to children from more affluent

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communities. The Journey Exchange™ is directed at this issue while simultaneously providing educational experiences in basic reading, writing, math and social studies.

The Journey Exchange™ requires teams of students in classrooms around the world to become partners in a journey. Starting in any city of their choice, students take an electronic journey to five cities. In each city they have to explore its history, culture, economics and geography. Then, as in real-life travel, they create and electronic postcard describing their city, providing concrete clues without actually naming the city. The clues can be text files, images and/or sound files. Next they have to select a mode of transportation, calculate how far it can travel in a day, balance their budget and travel to the next city. Again, they create a mult-media postcard with clues about their city. Ultimately, the two classrooms exchange their multi-media postcard by e-mail and guess each other's journey.

Again, as with all of our programs, WinStar for Education has striven to make the technology transparent to the educator. The only tool required to participate in The Journey Exchange™ is a browser and Internet access.

Tidal Passages™

Tidal Passages™ is our award winning Web-based collaboration that currently involves over four hundred schools from twelve countries around the globe. WinStar for Education has sponsored a middle school science teacher, Lorna Metzger, to sail onboard the Alvie, a one hundred twenty-five foot square-rigger sailing ship that is recreating the journey of the trade passages through the South Pacific.

Equipped with laptop computers, a satellite phone and digital camera, Lorna is involving children from around the world in a cross-cultural learning experience. Visiting exotic islands, describing the rigors aboard a sailing ship with no electricity, refrigeration or indoor plumbing, these students are using tomorrow's technology to experience the past.

The Alvei is on a five year journey. WinStar for Education will be sponsoring other educators to join the Alvei on its historic voyage and share that with students around the world.

Future Developments

Other Passages

The tools that WinStar for Education developed for Tidal Passages™ provide a "vehicle" by which many other passages are possible. For example, working with Texas Region 10, we are designing Prairie Schooner Passages™, in which the students of Texas will journey across their vast state as their forefathers before them in an actual prairie schooner wagon. Equipped with laptops, digital cameras and Internet connected cell phones, they will share the journey with students around the globe. WinStar for Education would like to explore similar ideas with DCPS, highlighting the skills of DCPS and the crucial role the Capital played in the development of our nation.

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Innovation-Life-Cycle™

WinStar for Education recently received a grant from New York State to create a suite of creative problem solving tools and a process of innovation for use within New York State education. We would like to pursue DCPS' involvement in this project.

Future Products

As with all of our customers, when DCPS becomes a WinStar for Education customer they will be entitled to receive all of the educational programs that we give free to our customers. Including those free programs yet to be developed.

Staff Development

Critical Element

Staff development is a critical success factor. Teacher's can be expected to integrate technology into the curriculum if and only if they receive the proper training. WinStar proposes, at no additional cost to DCPS, to "train the trainers" within DCPS. WinStar for Education will deliver both its basic Internet Boot Camp and Advanced Tool Training programs.

Internet Boot Camp

This course is a basic one-day class that will take the DCPS trainers through basic Internet. It spans topics from basic browser functionality to advanced search techniques. It is designed to make educators "comfortable" with exploring the Web which is the first step toward developing an Internet competency.

Advanced Tool Training

This course, also one day in length, focuses on the special tools and educational programs that WinStar for Education will be providing to DCPS. It covers tools such as the LivingPage™ WebBoard™, and NewsNow™. It also covers educational programs such as MindsEye Monster Exchange™, Insect Ecology Exchange™, Fish-N-Chips™, The Journey Exchange™ and Tidal Passages™. Teachers learn how to use the advanced tools to create, run and participate in collaborations over the Web, and produce their own electronic libraries, newspapers and on-line forums.

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Training the Trainers

This free training is limited to one teacher per school. These teachers are expected to become the local trainers and support network for DCPS.

Copies of Materials

WinStar for Education will provide DCPS with one hard and soft copy each of the training materials. The DCPS trainers will be permitted to use the materials free of charge for the express purpose of training the DCPS staff.

Statewide Network for 21st Century

DCPS has the goal of establishing a DC statewide network for the 21st Century. A network capable of supporting voice, video and data. The initial data and Internet network proposed here will in fact lay the foundation to accomplish that objective.

In addition, ideally, any network built today should lay the foundation for increasing the connectedness between the school system and its community. It should lay the foundation that places the school system at the center of life-long learning.

WinStar has recently lead the formation of a coalition involving the I Have a Dream Foundation, Communities in Schools, and Americorps/VISTA. This coalition is piloting a model program connecting schools with inner city housing complexes and senior citizen homes, that will increase the connectedness between schools and their communities, and allow schools to extend themselves into the very centers where the students and families live. This is an important step toward an infrastructure for life-long learning with the school as its nucleus.

WinStar's proposed network architecture and 38 GigHz Wireless Fiber℠ services positions DCPS to leverage this model. Potentially enabling DCPS to connect to a large segment of the community. It positions DCPS to adopt and implement the strategies highlighted by Vice President Gore in the recent "Connecting All Americans for the 21st Century" conference held in Washington DC. To offer both programs for the "latch-key" children and adults that will have a positive effect upon the education and economy of DC.

As a part of this proposal, WinStar for Education is prepared to work with DCPS in its attempts to obtain the funds to make this a reality, to connect where possible, using our Wireless Fiber℠ service, the housing complexes and senior citizen homes to the schools that the children attend. Further, to work with the coalition that WinStar for Education has formed, to develop the content and human resource to make this a reality.

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Telephony

WinStar has done a high level analysis on the local telephone bills for DCPS, were DCPS to contract with WinStar in the future for local telephone service, given the average annual expenditure of DCPS for local telephone service, and the significant difference between WinStar's rate and that of other available service providers, WinStar could save DCPS as much as one million dollars per year.

The following chart describes the cost differential between the District's current provider and WinStar Telecom for basic local telephone service.

Telephony Cost Comparisons

CURRENT PROVIDER AVERAGE ANNUAL COSTS	WINSTAR DISCOUNTS	WINSTAR ESTIMATED COSTS	ESTIMATED ANNUAL SAVINGS
$3,400,000	20% 1YR	$2,720,000	$680,000
$3,400,000	25% 2YR	$2,550,000	$850,000
$3,400,000	30% 3YR	$2380,000	$1,020,000

The cost comparison above represents estimated annual savings with Winstar on a 1 year, 2 year, and a 3 year commitment. Over these three years the DCPS estimated annual savings could amount to $2,550,000. This is two and one half million dollars that could be used to fund the technology plan if Universal Service E-rate ceased to exist

Cost Estimates

WinStar understands that DCPS desires to make its selection by April 15th, 1998. Therefore, WinStar is prepared to negotiate all final terms and conditions for a final contract with DCPS in anticipation of that date.

WinStar's cost estimates are contained on the next ten pages. The last two pages contain a summary of cost estimates for the ATM WAN, ITFS expansion, Internet access and the potential cost savings using WinStar local telephone services. All costs have been estimated for five and ten year commitments to provide the lowest possible cost to the District. In addition, costs have been estimated for both DS3 and OC3 level of connectivity to Core and Access sites, again to allow the District the greatest flexibility in selecting a solution.

The attached spreadsheets show the details of the cost estimates.

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ATM WAN Cost Analysis Assuming OC3 Backbone and DS3 Wireless Links - 5 Year Term

Category	Units	NRC/Unit	Total NRC	MRC/Unit	Total MRC	Comments
OC3 Fiber Optic Backbone assuming a 5 year term.						
- OC3 Link 1-2	1	0	0	9,500	9,500	OC3 fiber 12 St to K St
- OC3 Link 2-3	1	0	0	12,200	12,200	OC3 fiber K St to Good Hope
- OC3 Link 3-4	1	0	0	12,500	12,500	OC3 fiber Good Hope to 3rd St
- OC3 Link 4-5	1	0	0	12,000	12,000	OC3 fiber 3rd St to Varnum
- OC3 Link 5-6	1	0	0	12,400	12,400	OC3 fiber Varnum to Brandywine
- OC3 Link 6-1	1	0	0	12,300	12,300	OC3 fiber Brandywine to 12 St
Subtotal	6	0	0	70,900	70,900	Total OC3 fiber backbone costs
DS3 Wireless Fiber Links assuming a 5 year term.						
- Redundant to 7 Core Sch's	14	0	0	1,500	21,000	7 Core schools, two DS3's to each
- Single to 13 Access Sch's	13	0	0	1,500	19,500	13 Access schools, single DS3 to each
Subtotal	27	0	0	3,000	40,500	Wireless Fiber costs for 7 Core + 13 Access
Totals for ATM WAN		0	0	73,900	111,400	
Total Annual Cost Yr 1			$0		$1,336,800	
Total Annual Cost Yr 2-5					$1,336,800	

Note 1: WinStar's proposed network can reach 27 schools, we have used the RFP numbers for 7 Core and 13 Access for this calculation. DCPS can expand that to include additional schools that have line-of-sight from the network, costs will scale appropriately.

Note 2: The fiber optic backbone includes the two Server sites and four Wireless Fiber Hub sites.

Key: NRC = one time non-recurring charge. MRC = monthly recurring charges.

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ATM WAN Cost Analysis Assuming OC3 Backbone and DS3 Wireless Links - 10 Year Term

Category	Units	NRC/Unit	Total NRC	MRC/Unit	Total MRC	Comments
OC3 Fiber Optic Backbone assuming a 5 year term.						
- OC3 Link 1-2	1	0	0	9,500	9,500	OC3 fiber 12 St to K St
- OC3 Link 2-3	1	0	0	12,200	12,200	OC3 fiber K St to Good Hope
- OC3 Link 3-4	1	0	0	12,500	12,500	OC3 fiber Good Hope to 3rd St
- OC3 Link 4-5	1	0	0	12,000	12,000	OC3 fiber 3rd St to Varnum
- OC3 Link 5-6	1	0	0	12,400	12,400	OC3 fiber Varnum to Brandywine
- OC3 Link 6-1	1	0	0	12,300	12,300	OC3 fiber Brandywine to 12 St
Subtotal	6	0	0	70,900	70,900	Total OC3 fiber backbone costs
DS3 Wireless Fiber Links assuming a 10 year term.						
- Redundant to 7 Core Sch's	14	0	0	1,200	16,800	7 Core schools, two DS3's to each
- Single to 13 Access Sch's	13	0	0	1,200	15,600	13 Access schools, single DS3 to each
Subtotal	27	0	0	2,400	32,400	Wireless Fiber costs for 7 Core + 13 Access
Totals for ATM WAN		0	0	73,300	103,300	
Total Annual Cost Yr 1			$0		$1,239,600	
Total Annual Cost Yr 2-10					$1,239,600	

Note 1: WinStar's proposed network can reach 27 schools, we have used the RFP numbers for 7 Core and 13 Access for this calculation. DCPS can expand that to include additional schools that have line-of-sight from the network, costs will scale appropriately.

Note 2: The fiber optic backbone includes the two Server sites and four Wireless Fiber Hub sites.

Key: NRC = one time non-recurring charge. MRC = monthly recurring charges.

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ATM WAN Cost Analysis Assuming OC3 Backbone and OC3 Wireless Links - 5 Year Term

Category	Units	NRC/Unit	Total NRC	MRC/Unit	Total MRC	Comments
OC3 Fiber Optic Backbone assuming a 5 year term.						
- OC3 Link 1-2	1	0	0	9,500	9,500	OC3 fiber 12 St to K St
- OC3 Link 2-3	1	0	0	12,200	12,200	OC3 fiber K St to Good Hope
- OC3 Link 3-4	1	0	0	12,500	12,500	OC3 fiber Good Hope to 3rd St
- OC3 Link 4-5	1	0	0	12,000	12,000	OC3 fiber 3rd St to Varnum
- OC3 Link 5-6	1	0	0	12,400	12,400	OC3 fiber Varnum to Brandywine
- OC3 Link 6-1	1	0	0	12,300	12,300	OC3 fiber Brandywine to 12 St
Subtotal	6	0	0	70,900	70,900	Total OC3 fiber backbone costs
OC3 Wireless Fiber Links assuming a 5 year term.						
- Redundant to 7 Core Sch's	14	0	0	4,500	63,000	7 Core schools, two OC3's to each
- Single to 13 Access Sch's	13	0	0	4,500	58,500	13 Access schools, single OC3 to each
Subtotal	27	0	0	9,000	121,500	Wireless Fiber costs for 7 Core + 13 Access
Totals for ATM WAN		0	0	79,900	192,400	
Total Annual Cost Yr 1			$0		$2,308,800	
Total Annual Cost Yr 2-5					$2,308,800	

Note 1: WinStar's proposed network can reach 27 schools, we have used the RFP numbers for 7 Core and 13 Access for this calculation. DCPS can expand that to include additional schools that have line-of-sight from the network, costs will scale appropriately.

Note 2: The fiber optic backbone includes the two Server sites and four Wireless Fiber Hub sites.

Key: NRC = one time non-recurring charge. MRC = monthly recurring charges.

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ATM WAN Cost Analysis Assuming OC3 Backbone and OC3 Wireless Links - 10 Year Term

Category	Units	NRC/Unit	Total NRC	MRC/Unit	Total MRC	Comments
OC3 Fiber Optic Backbone assuming a 5 year term.						
- OC3 Link 1-2	1	0	0	9,500	9,500	OC3 fiber 12 St to K St
- OC3 Link 2-3	1	0	0	12,200	12,200	OC3 fiber K St to Good Hope
- OC3 Link 3-4	1	0	0	12,500	12,500	OC3 fiber Good Hope to 3rd St
- OC3 Link 4-5	1	0	0	12,000	12,000	OC3 fiber 3rd St to Varnum
- OC3 Link 5-6	1	0	0	12,400	12,400	OC3 fiber Varnum to Brandywine
- OC3 Link 6-1	1	0	0	12,300	12,300	OC3 fiber Brandywine to 12 St
Subtotal	6	0	0	70,900	70,900	Total OC3 fiber backbone costs
OC3 Wireless Fiber Links assuming a 10 year term.						
- Redundant to 7 Core Sch's	14	0	0	3,600	50,400	7 Core schools, two OC3's to each
- Single to 13 Access Sch's	13	0	0	3,600	46,800	13 Access schools, single OC3 to each
Subtotal	27	0	0	7,200	97,200	Wireless Fiber costs for 7 Core + 13 Access
Totals for ATM WAN		0	0	78,100	168,100	
Total Annual Cost Yr 1			$0		$2,017,200	
Total Annual Cost Yr 2-5					$2,017,200	

Note 1: WinStar's proposed network can reach 27 schools, we have used the RFP numbers for 7 Core and 13 Access for this calculation. DCPS can expand that to include additional schools that have line-of-sight from the network, costs will scale appropriately.

Note 2: The fiber optic backbone includes the two Server sites and four Wireless Fiber Hub sites.

Key: NRC = one time non-recurring charge. MRC = monthly recurring charges.

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ATM WAN Summary Cost Analysis

Table 1: Monthly Recurring Cost Analysis

	Term of Contract in Years	
Core/Access Bandwidth	**5 Year**	**10 Year**
DS3 Links	$1,336,800	$1,239,600
OC3 Links	$2,308,800	$2,017,200

Table 2: Non- Recurring Cost Analysis

	Term of Contract in Years	
Core/Access Bandwidth	**5 Year**	**10 Year**
DS3 Links	$0	$0
OC3 Links	$0	$0

Note 1: Includes 2 Server sites, 9 Core sites and 13 Access sites year one.
Note 2: WinStar's proposed network would allow additional Core/Access sites in year one.
Note 3: Each Core site has two Wireless Fiber links to the backbone.
Note 4: Each Access site has a single Wireless Fiber link to the backbone.
Note 5: WinStar's proposed architecture allows Core/Access sites to change over time.
Note 6: There are no one time non-recurring charges for either 5 or 10 year terms.

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Internet Access Pricing 45 Mbps Port

Monthly Recurring Port Charges	18,500
Monthly Recurring Local Loop	1,200
Non-Recurring Installation	0
Monthly Recurring Total	19,700
Annual Recurring Total	$236,400

Local Telephone Cost Analysis

CURRENT PROVIDER AVERAGE ANNUAL COSTS	WINSTAR DISCOUNTS	WINSTAR ESTIMATED COSTS	ESTIMATED ANNUAL SAVINGS
$3,400,000	20% 1YR	$2,720,000	$680,000
$3,400,000	25% 2YR	$2,550,000	$850,000
$3,400,000	30% 3YR	$2,380,000	$1,020,000

Were DCPS to contract with WinStar in the future for local telephone service the cost comparison above represents estimated annual savings with Winstar on a 1 year, 2 year, and a 3 year commitment. Over these three years the DCPS estimated annual savings could amount to $2,550,000. This is two and one half million dollars that could be used to fund the technology plan if Universal Service E-rate ceased to exist.

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