Master Plan for Education Technology

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KETS Master Plan for Education Technology

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Preface

The development of this Master Plan for Education Technology has been a challenge, possibly even surpassing the 1990 effort to draft and pass the Kentucky Education Reform Act (KERA). Many fine people have devoted hundreds of hours to the effort, and the list of collaborative organizations is impressive.

Possibly the most difficult aspect of this effort has been overcoming the penchant of stakeholders to want to see everything in operation before deciding it is right for them, for their school, and for the Commonwealth. This, of course, is not possible since the Kentucky Education Technology System (KETS) is a vision of the future that must first be believed to be seen.

Undaunted by the absence of a blueprint verified by others, the people who helped with this effort have succeeded in designing the future. In the final analysis, they did so because they are people of vision, and they care deeply about Kentucky's children.

Acknowledgements

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FOREWORD

The 1990's will be an exciting time for Kentucky's schools a time of great change and challenge. As educators strive to address the needs of students, they must begin, as a result of the Kentucky Education Reform Act (KERA), to reassess the role and purpose of the current educational system.

As teachers and administrators attempt to reform and restructure schools, they must provide their students with new skills and competencies necessary to compete in an information-based global economy. These skills involve much more than traditional knowledge acquisition. The "new basic skills" for the twenty-first century will require that students have the ability to access, analyze, and communicate information effectively. They must be empowered through the use of technology to create their own knowledge. As information changes and increases exponentially, students must be able to think more critically, to communicate more creatively and to solve problems more analytically. All of these information-processing skills will enable Kentucky's students to assume a productive role in an information age. By the year 2000, the demand for knowledge workers will increase ten-fold. Without widespread, systematic integration of the "new basic skills" into the curricula, the need for knowledge workers will be left unmet, and Kentucky's economic position in the United States and world will be uncertain.

Several characteristics of 21st century schools impact the design and development of Kentucky Education Technology System (KETS). The pace and complexity of change places enormous demands on educators at all levels to access, interpret, and communicate information more rapidly than in the past. The proliferation of information about students, resources, and curriculum are increasing the difficulty in making decisions and development quality education programs in a timely manner. Moreover, within a shared decision-making environment, information needs to be available to students, parents, teachers, principals, and administrators. KETS will assist decision makers to focus the organization and to respond to demands for accountability by various stakeholders in the educational community. What is needed in our schools today is an education technology system that serves everyone throughout the school, from students to school board members and, indeed, the community itself.

Unfortunately, Kentucky's schools have acquired technology in a piecemeal fashion as budgets permit. Advances in technology have left schools with a variety of software, hardware, and network components that may be islands of information - instructional technology, student information systems, telecommunication services, office automation - on different computer systems not readily accessible to all who need them. In developing KETS as a comprehensive and systemic education technology system, these challenges will be addressed. We will implement a communication network, provide additional technology resources, and incorporate the existing technology while at the same time improving instruction, communication, and organizational efficiency. KETS has been designed in cooperation with several other statewide technology initiatives. For example, upon implementation of the fiber optic network backbone by the Department of Information Systems (DIS), the KETS network system will be readily integrated.

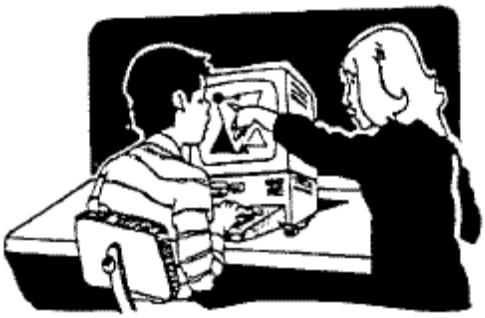
The new education technologies can greatly impact the teaching, learning, and management process. However, the KETS initiatives recognize that such a transformation will not be accomplished by focusing exclusively on bringing the technology into existing management and instructional processes or by merely automating existing procedures. Re-conceptualizing teaching, learning, and management activities will be accomplished before, or at least simultaneously with, the design and implementation of KETS. The mere availability and incorporation of technology tools will not bring about a pervasive transformation in teaching, learning, or management. In order to obtain the maximum benefit from the new and emerging technologies, we must first reach beyond the schools we have now in order to envision the type of schools Kentucky needs.

The KERA legislation and the Master Plan for Education Technology places Kentucky in a position of worldwide leadership in educational reform. No other state or foreign nation has mandated such a comprehensive educational reform effort or such an all-encompassing technology-based instructional delivery and support system.

_____

Sherry Jelsma, Chairperson
Council for Education Technology

Chapter 1 Executive Summary



1.1 The Master Plan for Education Technology

The Master Plan for Education Technology is a direction-setting document that will guide the Commonwealth's efforts to modernize its public school system for the remainder of this decade. The Master Plan for Education Technology addresses the major issues surrounding this effort and answers the strategic question of what should be done to bring technology to the schools.

The Master Plan for Education Technology is consistent with the underlying tenets of KERA. The essence of the plan is its blending of Commonwealth-wide coordinated planning with decentralized local educational agency (LEA) implementation. Through this plan, the Commonwealth will provide LEAs with planning guidelines and assistance, but leave the actual decisions on where and how to focus classroom technology to the districts and schools. So long as the local district and school meet the planning guidelines, the Commonwealth will provide financial and other assistance to help the local district and school implement their plans. The Commonwealth planning guidelines will require that education technology be applied in those curriculum areas that can raise student achievement results and school success, as measured by the accountability system. This will ensure that local implementation plans result in an infusion of education technology in focused and concentrated areas of a school's curriculum, rather than being spread out over the entire school.

In addition to this blending of Commonwealth-wide coordinated planning and decentralized implementation, the Master Plan for Education Technology is based upon the recognition that the Commonwealth's modernization program is not a one-time event, but rather the beginning of an ongoing process. This belief has driven many of the planning decision, such as basing the entire system on open-system or multi-vendor standards and forward-looking technical specifications.

The Master Plan for Education Technology addresses the need to ensure equitable access to education technology by establishing a state standard for the level and type of technology within each school. The Commonwealth will provide financial and technical assistance to each and every school until the school attains the standard. The Master Plan for Education Technology establishes the funding requirements and resource allocations necessary to ensure that every school reaches the standard.

The Master Plan for Education Technology lays out the overall strategy for implementation but does not attempt to incorporate detailed implementation plans and technical specifications. The Commonwealth has retained the services of a technology consultant/contractor to work with the Kentucky Department of Education to develop the details for implementing the Commonwealth's education technology system. This detailed planning will be completed in time to being implementation by July 1, 1992.

1.2 The Development Process

The Commonwealth has spent almost eighteen months in the development of this Master Plan for Education Technology. This planning period has allowed the wide-ranging discussion befitting an undertaking of this magnitude, importance, and cost.

The focal point of the planning effort has been the Council for Education Technology, which is an advisory group to the State Board for Elementary and Secondary Education. The Council is composed of members representing the primary clients of the program. The membership includes a teacher, technology coordinator, superintendent, distance learning provider, private sector representative, higher education representative, state board member, and representatives from the executive and legislative branches of the state government.

The Council has visited out-of-state and in-state exemplary technology programs and has taken input from a wide range of education technology vendors. The Council has relied on two Commonwealth-wide committees, Instructional Technology Applications Advisory Committee (ITAAC) and Management Technology Applications Advisory Committee (MTAAC) of educators and administrators to provide the functional scope of education technology covered by the Master Plan for Education Technology. Additionally, Kentucky Department of Education (KDE) staff has presented and discussed various aspects of the program at regional meetings throughout the Commonwealth. KDE has also relied upon the Kentucky Association of Technology Coordinators for review of working papers and participated in the professional development programs conducted by the Kentucky School Board Association, Kentucky Association of School Administrators, Kentucky Association of School Superintendents, and regional cooperatives and staff development consortia.

In pursuit of more formal and detailed plans, KDE retained the short-term services of three internationally renowned technology planning firms. These firms worked to develop competitive master plans which were reviewed by the Kentucky Education Association, three of the Commonwealth's major universities, three of the Commonwealth's major corporations, several state agencies, and five out-of-state state-level education technology planners. The best plan was selected and used as the basis for merging promising aspects of the two other plans.

This Master Plan for Education Technology is a reflection of all these efforts over the past eighteen months. The detailed implementation plan and technical specification that will follow the adoption of this plan will rely heavily upon the work of the three technology planning firms. The technology planning firm that developed the best plan, now the KDE's consultant/contractor, is assisting in the development of this Master Plan for Education Technology, and will assist KDE during implementation.

1.3 Scope and Benefits

The goal of the Master Plan for Education Technology is to bring about equitable and efficient use of technology in instruction and administration, improve teaching and learning, improve instructional outcomes for children, and enhance operation of the public school system. The Master Plan for Education Technology therefore calls for a system of education technology that spans both the instructional and administrative aspects of all levels of the public school system.

Within the instructional aspects, the program encompasses high levels of technology that are directly accessible by learners and teachers. Over 80% of the total program resources are allocated directly to classrooms. The program includes direct student instruction through technology, instructional management, classroom management, assessment, valued outcomes, and other powerful teacher support systems.

Within the administrative aspects, the program encompasses improved student records and information, financial management, personnel management, facilities planning and utilization, energy management, and many other administrative functions.

A key aspect of this Master Plan for Education Technology is its vision for realizing a single system of education technology that integrates instruction and administration. This vision will replace the separate systems approach that has traditionally dominated prior efforts to apply education technology. The Master Plan for Education Technology's vision will result in lower total costs for education technology and truly integrated information for local and state decision-making.

Another aspect of this Master Plan for Education Technology is its recognition that a significant portion of the potential of education technology will always remain unrealized without a pervasive education communications network to serve as the link between users and the highway over which information will flow. This infrastructure, the education communication network, is essential to creating the Commonwealth-wide educational community envisioned in KERA, and providing Kentucky's students and teachers with access to the world of information and knowledge. The network is also a prerequisite to improving the efficiency of school, district office, and state operations and is a statutory requirement of HB 940.

The Master Plan for Education Technology also calls for the extension of the communications infrastructure to students' families. This is accomplished by the integration of telephones, voice mail, and messaging at each school so that teachers and parents can more easily and frequently communicate. Thus, homework assignments, attendance information, school activities, and similar information can be accessed from the home via telephone.

Security and failure recovery were designed into the education technology system at every level. Security considerations address both physical security and unauthorized access and use. Failure recovery addresses the required system availability at each level in the network and how trained technical staff will execute recovery procedures.

1.4 Costs and Timelines

The education technology system has been designed as a modular network of personal and small computers and related peripherals that are based upon industry trends and open

systems (non-proprietary) standards. This design lends itself to incremental expansion and field upgrade as usage increases and newer technologies emerge.

With proper maintenance and appropriate upgrading starting in year seven, the system will have an ongoing useful life that will continue to meet the needs of Kentucky's public schools well into the next century.

This Master Plan for Education Technology calls for the education technology system to be fully in place within six years. The system will cost approximately $346 million in one-time costs, and approximately $22 million per year to operate and maintain (after fully implemented). Approximately $30 million per year will be required for an expansion, replacement, and upgrade program to extend the system's useful life, commencing in year seven.

The approximately $346 million in one-time costs will be shared between the state and local districts on a 50/50 matching funds basis, as prescribed in HB 698 enacted on April 2, 1992. The Commonwealth will bear the maintenance costs of the state and district office levels of the system. Local school districts will bear the maintenance costs of the system's school, classroom, and family/school connection levels.

State assistance will be offered to local districts that have schools that are below the state established standard, provided that such schools complete the educational technology planning process that meets state guidelines. HB 698 contains a provision which, in year one of the program, allows state funds to be released to local districts without prior planning, provided such action is recommended by the Council for Education Technology and approved by the State Board for Elementary and Secondary Education.

The $346 million in one-time costs will put in place the essential infrastructure for the ongoing program of education technology. Extensions to this system will await completion of the basic system or may be acquired by local districts without state matching funds. The basic education technology system has been designed to integrate the full range of voice, video, and computer-based education technologies that are now emerging. HB 698 contains a provision that requires the Council for Education Technology to undertake a planning effort to define the different types of distance learning delivery systems, an evaluation process for determining and certifying the educational and cost-effectiveness of each type of delivery system, comparisons of the various types of delivery systems, and recommendations for implementation. This effort must be completed before July 1, 1993 in order for the next legislative session to consider funding for distance learning.

The Master Plan for Education Technology sets specific objectives for the next two years with more generally stated objectives for each subsequent two-year period. The program is currently funded only through the upcoming biennium.

1.5 Implementation

The Master Plan for Education Technology describes a multi-pronged implementation strategy which uses one (1) pilot and eight (8) model sites, plus an array of service providers and contractors to rapidly move implementation forward. It is essential that early on, education technology be successfully integrated into enough school systems to

demonstrate the power of technology to improve education and thus ensure the continued implementation of KETS.

Upon adoption of the Master Plan for Education Technology, the following concurrent projects will be initiated:

- Negotiation of Commonwealth-wide procurement agreements for hardware, software, and technical services.
- Regulations covering the essential aspects of the program implementation will be recommended by the Council for Education Technology and promulgated by the State Board for Elementary and Secondary Education.
- Detailed strategic technology planning guidelines will be published so that school districts may begin planning or bring current plans into compliance with the new guidelines.
- Detailed planning will be finalized to allow implementation of the Commonwealth-wide communications network and the administrative system.
- Criteria for pilot and model sites will be published and sites will be selected.
- Capacity-building programs will be developed in order to expand the technology planning, technical assistance and professional development capabilities of existing local service agencies (higher education campuses, regional cooperatives, staff development consortia, etc.)
- Procedures for administering state offers of assistance to local districts will be developed.
- Program advisories will be prepared by KDE in order to immediately communicate the key points of the program to local districts.
- A program evaluation design will be developed as a component of the overall KERA evaluation program. This design is currently being developed through a joint venture between KDE and several universities.
- In order to conduct these concurrent projects, KDE will coordinate the efforts of the following state agencies and other organizations:
    - - Finance and Administration Cabinet for administering the offers of assistance to local districts and finishing the allocation of resources to the administrative system.
      - Department of Information Systems for integration of the education communications network with Commonwealth-wide network planning.
      - Workforce Development Cabinet to finalize the integration of its vocational/technical schools into the communications network.
      - Kentucky Educational Television to define the information dissemination and professional development

services.
- Local Service Agencies to assess current service capabilities and identify capacity-building needs.
- Council on Higher Education to further define the role of higher education.
- KDE contractor to finalize detailed specifications and develop project definitions, work plans, and progress reporting.

1.6 Progress Reviews, Cost Controls, and Evaluation

The Consultant/Contractor will provide KDE with weekly status reports. The Consultant/Contractor will provide status reports to the Council for Education Technology monthly. Both status reports will include expenditure data as required by HB 698.

The Council for Education Technology will submit a status report to the state legislature in July of each year. The program will also receive an in-depth review at the end of each of the program's phase with a report to the state legislature and SBESE for approval.

Operational expenditures require the recommendation of the Council for Education Technology and approval of the State Board for Elementary and Secondary Education.

Formative and summative evaluations will be conducted within the KERA evaluation program. Formative evaluations will be designed to provide the implementation effort with guidance information. Summative evaluations will be designed to provide information on the extent to which the program's goal is being realized at incremental points.

1.7 Relationship to Other KERA Initiatives

The education technology program described in this Master Plan for Education Technology is essential to Kentucky's efforts to bring about equitable and efficient use of education technology and also supports many other KERA initiatives:

- New valued outcomes require high levels of student access to technology.
- New assessment system requires technological support for delivery and results analysis.
- Primary program requires technology to support individualized instruction.
- School-based decision-making requires improved information management.
- Extended school services require better family-school communication.
- Family Resource/Youth Service Centers require inter-agency networking.
- Efficiency improvement in schools requires an enhanced financial information management system.

Chapter 2 Introduction

2.1 Purpose

This Master Plan for Education Technology, prepared by the Council for Education Technology (CET), is part of a broader picture of educational reform within Kentucky. There is a direct connection between this plan and the other reform initiatives launched through the Kentucky Education Reform Act (KERA) of 1990.

Rather than focusing on instructional technology, administrative technology, or local level initiatives, the Master Plan for Education Technology focuses on all three initiatives within all levels of the public school system, and addresses the following technologies:

- Computer-Based Technology
- Video Projection/Transmission and Receiving/Feedback Systems
- Audio Systems (Telephone, etc.)
- Print and Image Technologies
- Distance Learning (Satellite and Terrestrial Based Technologies) as per HB 698
- Intra- and Inter-building Networking (Local Area Networks, Campus Networks)
- Inter-Agency Networking (Telecommunications, Fiber Optics, Microwave)
- Mass Storage Systems (CD-ROMs, etc.)

2.2 Document Organization

The Master Plan for Education Technology is organized into the following sections:

- Chapter 1 Executive Summary
- Chapter 2 Introduction
- Chapter 3 Kentucky Education Technology System Overview
- Chapter 4 Organization and Management
- Chapter 5 Funding and Budget Parameters

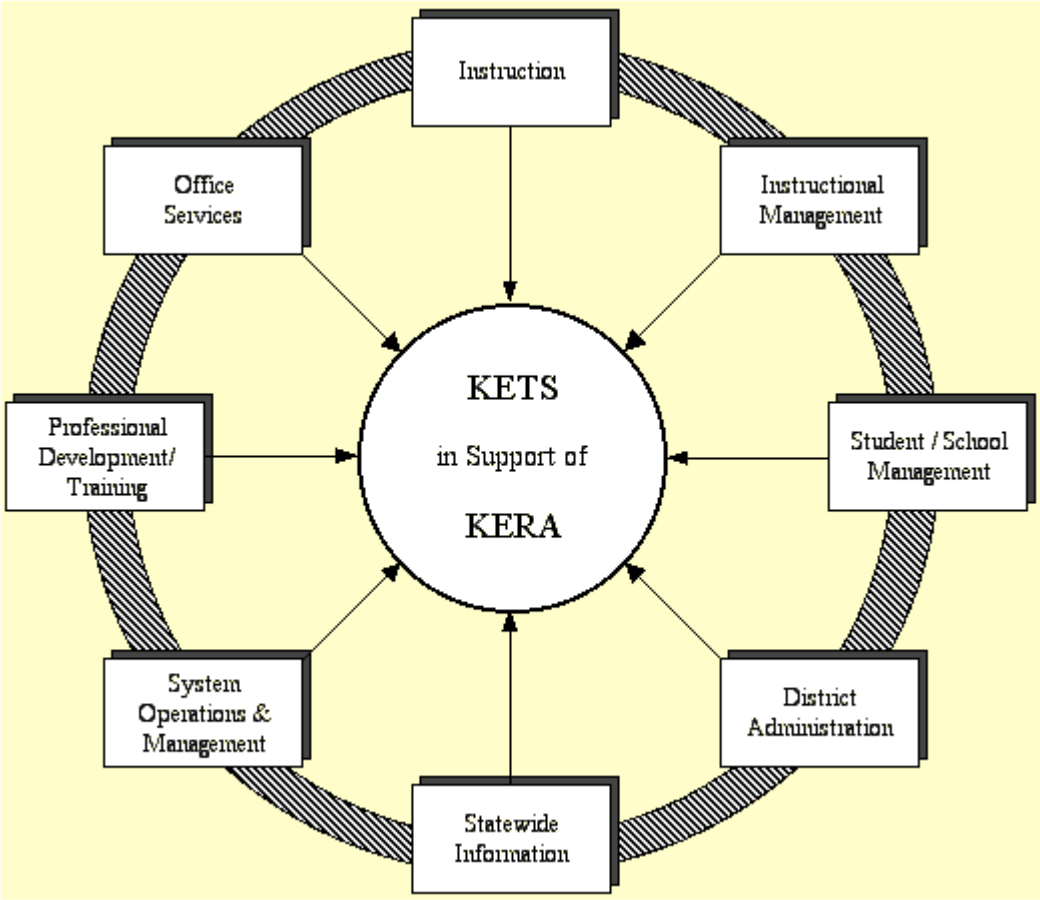
2.3 Goals and Objectives

The major goal of KETS is to provide a technical and program framework, and technical assistance programs for the equitable, efficient, and effective use of technology. The KETS technology will improve instruction through improved communication among teachers, students, parents and administrators; and through improved administration of the public education system.

The objectives of KETS are

- To ensure equal access to educational technology for all students, teachers, and administrators.
- To enable students to use technology to become independent, lifelong learners.
- To empower teachers to use technology as a tool for improving instructional presentations and classroom management.
- To develop service capacities in local service agencies (regional cooperatives, staff development consortia, universities, etc.) at the level required to meet all local district/school needs.
- To develop an education communication network for voice, video, and data that will interconnect all computer workstations in the classroom, school, district, office, public library, and Kentucky Department of Education with other statewide and national education networks.
- To implement technology applications for instruction, instructional support, student/school management, administrative systems, statewide information, office services, and communications/network services as shown in Figure 2-1.
- To prepare a highly trained Kentucky workforce for adding a new industrial development dimension. This will be accomplished by preparation of Kentucky's children to work effectively in the information age.

Figure 2 1: Conceptual Application and Integration Model



2.4 Benefits

Figure 2 2 lists KETS' benefits. The most important benefit is that KETS will make technology available on an equitable basis for all students.

Figure 2-2: Kentucky Education Technology System Major Benefits Summary

	Family School Involvement • Parent Teacher Interaction • School Community Interaction • Access via Voice Messaging Systems	
	Help Teacher Get the Job Done • Less Time/Better Records, Attendance, Grades, Individual Student Lesson Plans • Greater Access to Instructional Materials • Allows Individual Instruction • Accessible to Disabled	Support for Assessment/ Accountability • Distribution of Assessment Materials • Scoring and Data Collection • Computer Based Data Analysis Technical Skills for all Kentucky Children • Ability to Access, Analyze and Communicate Information • Tools for Knowledge, Creation & Synthesis • Adequate Computers for Students
	Standardized Student Records • Consistency Between Schools/Districts • Automatic Records Transfer • Efficient Records Storage • Efficient Attendance & Records	Improved Staff Effectiveness • Educational Research/Practice • Information-Based Decision Making
	Standardized Administrative/Financial Records • More Reliable Census • Consistent Accounting Practices • More Timely Reporting • Greater Staff Mobility • Efficient Accounting/Records	Better Communications • District Offices and Schools • State Agencies and District Offices Extended School Services • Public Libraries

	Accounting/Records	• Museums • Other Informal Educational Organizations
	<u>Cost Savings</u> • One System for Administration & Instruction • Merging of MIS/Data Processing & Instructional Technology • Increased Accuracy of Census & Accounting Data • Statewide Licensing of Administrative & Instructional Software	<u>Quality Control of Instructional Software</u> • Evaluation Against Valued Outcomes • Version Control

2.41 Benefits to Family/School Connection

KETS will make greater interaction between parents and schools possible as follows:

- Facilitates parent/teacher interaction
- Parental access to school, administration, and teachers via voice messaging
- Supports teacher, student, and parent communication and collaboration

2.4.2 Benefits to Student Learning

KETS will improve student learning as follows:

- Development of thinking and problem solving skills by analyzing information with technology tools
- Development of communication skills through writing and the exchange of information with students at other sites
- Availability of access to instructional computer software across the network
- Development of basic skills and concepts from simulations and computer-assisted instruction
- Availability of instructional databases to help students expand their research/information processing skills
- Development of student awareness of a multi-cultural world view through telecommunications access and communication with students at other schools throughout the world

- Encouragement of respect of rights of others and ethical issues in using school technology assets

2.4.2 Benefits to Teacher Productivity

KETS will increase teacher productivity as follows:

- Improved effectiveness and efficiency of instruction, curriculum development, school organization and operation
- Telecommunications access for improved communication among teachers, parents, and students
- Computer-managed instruction delivery system
- Use of computer for special education management
- Reduction of teacher paperwork
- Encouragement and support for joint curriculum development and sharing
- Improved capacity to individualize instruction and to monitor assessment

2.4.4 Enhanced Communications

KETS will facilitate communications as follows:

- Immediate transmittal of memos, letters, bulletins, reports, and documents
- Improved communication between all buildings, school districts, libraries, and KDE
- Facilitation of communication between two individuals, among several individuals (conferencing), from one individual to a select list or network-wide
- Automation of calendars and scheduling to assist coordination of personnel, building, and district resources
- Creation of "electronic communities"

2.4.5 Improved Data Collection and Processing

KETS will improve data collection and management as follows:

- Improved accuracy and timeliness of information
- Centralized data reduces costs and errors
- Data collection becomes a by-product of daily processing activities
- Required reports are automatically generated from the database
- Data retrieval is simple and available in multiple formats providing flexible access
- Data is maintained (stored) electronically and printed only when required
- Required Commonwealth data can be reported electronically

2.4.6 Network Infrastructure

The KETS network has the following advantages:

- Interconnection of all school buildings, educational centers, libraries, and Commonwealth-wide education networks
- Establishment of common resource databases
- Adoption of standards and protocols for data collection and for communications
- Current and timely information for decision making
- Quick and easy sharing of information
- Equitable access to information regardless of the size of location of the school districts
- Information processing and communication services at reduced costs

2.5 KETS Program Guidelines

Education technology can assist the learners, teachers, and school administrators of Kentucky in achieving the goals of the Kentucky Education Reform Act. The Council for Education Technology embraced the principles listed below in developing this Master Plan for Education Technology for enhancing education in Kentucky through the use of technology. These principles are fully addressed in the technical specification documents.

- Place technology in the hands of learners.
  - One workstation for each six students will be acquired to support KETS.
  - Student workstations will be connected to a statewide network, thereby providing student access to the whole world of information.
- Change the nature of present teaching practices rather than simply supplement them.
  - Technology competencies will be integrated into the core curriculum.
  - Technology will be as a tool for accessing, analyzing, and communicating information.
- Reflect the concept that technology is a means to improve performance for all agents of the education process, not an end in itself.
  - All KETS Technology will be integrated into the delivery and administration of education.
- Ensure that the infusion of technology into instruction is guided by the student performance outcomes and indicators of school success.
  - Curriculum management technologies will provide classroom assessment tools.
  - Organization of KERA assessment program data will allow for correlating student performance.

- Education Technology Planning will focus on improving student and school performance in specific curricular areas and instructional levels.

- Direct the implementation of education technology in a manner that supports the concept of site-based management.
  - Access to decision-making information will be provided over the Education Communication Network (ECN).
  - Increased communications will facilitate site-based decisions.
  - Planning and implementation of the KETS technologies will occur from the school building up and the state down.
- Ensure the deployment of limited technology funds in an equitable and efficient manner.
  - Offers of assistance ensure funds are equitably directed toward unmet needs.
  - District planning ensures funds are effectively spent.
  - Local district matching funds ensure local buy-in and support.
- Encourage districts that have already invested in technology.
  - HB 698 defines the criteria for the use of district matching funds and recognizes obligations stemming from past acquisitions.
  - Utilization of existing KETS standard resources maximizes districts' current investment. The responsibility to ensure that such resources are integrated into KETS will be shared by the local district, KDE, and the contractor.
- Provide for measured and continuing in-depth planning at the state, school district, and school level over time, thus ensuring the most efficient and appropriate infusion of technology.
  - The Blueprint/Selection Guide and Technical Specifications documents, combined with KDE expertise and contractor technical assistance will ensure the efficient and appropriate infusion of technology.
- Allow effective connectivity among users of education technology.
  - Communications across the Education Communication Network optimizes connectivity.
  - KETS Standards ensure the integration of the entire system.
- Include strategies for seeking the broadest possible input from all stakeholders, users, and providers of technology.
  - Input from the Council for Education Technology, Instructional Technology Applications Advisory Committee (ITAAC), Management Technology Applications Advisory Committee (MTAAC), Local Education Agency (LEA), Higher Education, school district planning committees, Consultants/Contractors, stakeholders, users, and providers.
- Require that the selection and use of hardware and software be based on research and careful evaluation.
  - The KETS Standards and processes defined in the Master Plan for Education Technology are based on a thorough knowledge of

the marketplace and school district environments.
- The planning guidelines for local districts require a thorough review of relevant educational research on the most appropriate strategies for applying education technology.

- Provide for adequate initial and continuing training of personnel who will be using the technology.
  - The Education and Technical Support program recognizes that a significant requirement exists for both one-time and ongoing development of Kentucky's education staff.
- Allow for maintenance and upgrading of all components of the technology.
  - The System Design incorporates maintenance and upgrading.
  - Required maintenance is an integral part of the Master Plan for Education Technology.
  - Scheduled upgrade milestones are an essential component of the specification.
- Require some form of "buy in" by local districts in which the receipt of funds for technology is contingent upon demonstration of local school district's willingness to prepare for and support the implementation of all aspects of KETS.
  - The Blueprint/Selection Guide outlines this process.
  - Offers of assistance mandate "buy in" by local districts to receive funds.
  - Matching funds are an integral component of KETS.
- Carry out measures that are necessary to meet the mandate of the Kentucky Education Reform Act to implement an administrative system in all districts.
  - District planning is required to address administrative systems. The responsibility of this planning will be shared by the local district, KDE, and the contractor.
  - A statewide financial/administrative system is a top implementation priority.

2.5.1 Implementation Guidelines

The following implementation guidelines/policies are basic assumptions for the KETS implementation:

- Large-scale technology projects succeed primarily as a result of attention to the human development aspects of the project.
- The proper technique to test concepts is by appropriately piloting them.
- Coordinated statewide planning with bottom up implementation to adequately consider local issues and priorities is most appropriate.
- Local school district planning must precede offers of assistance.
- Even though the vision of KETS is comprehensive, it is essential that results be attained incrementally, ideally every six months.

2.6 Implementation Overview

The implementation of KETS has been divided into five (5) separate and distinct phases. For a detailed description of the implementation plan, please refer to the "Implementation Plan."

Figure 2-3: Phase Implementation Schedule

Sept 1991 - June 1992	July 1992 - May 1993	June 1993 - June 1996	July 1996 - June 1998	July 1998 - June 2000
Phase I **Planning**	**Phase II** **Initial Implementation**	**Phase III** **Broad scale Implementation**	**Phase IV** **Complete Implementation**	**Phase V** **Ongoing Operations**
Development of preliminary technology specifications Selection of KETS Consultant/Contractor	School district planning, pilot testing, modeling Installation of administrative system Initial implementation of school and classroom systems Development of education and technical support programs. Develop and conduct public information program	Refinement of administrative system Implement on-going education and technical support plan Continue public information program Continue pilot program Implement school systems Continue implementing classroom systems	On-going broad scale implementation Begin long-term maintenance and upgrade plan	Continue long-term maintenance plan Begin upgrade and extension program.

2.7 Outcomes and Milestones

The following outcomes and milestones have been established by KDE to guide the KETS implementation. They are based upon the available allocation of funds, availability of technical assistance services, and a sequential level of LEA readiness. As these factors change, the implementation schedule will be adjusted accordingly.

Table 2-1: Milestone Schedule

PHASE	DATES	OUTCOMES/MILESTONES
I - Planning	**Sept 1991 to June 1992**	• Select KETS consultant/contractor • Adopt Master Plan for Education Technology • Integrate, synthesize, and finalize technical specifications • Develop school district education technology planning process • Design detailed plan for implementation of administrative systems • Develop KETS standards and timelines for education and technical assistance • Develop KETS public awareness
II - Initial Implementation	**July 1992 to May 1993**	• Develop 176 school district education technology plans • Initiate pilot site, model sites, and public information programs • Implement communications network for all school districts and KDE • Initial implementation of 176 administrative systems • Professional development and training for 176 educational technology coordinators and 1,050 information technology specialists (library media specialists) • Provide KETS awareness to 35,000 teachers and 5,578 administrators • Procure and install 18,737 student workstations • Procure and install 11,514 teachers and administrator workstations • Wire 4,356 classrooms and offices • Connect office of Education Accountability to KDE with online database query and retrieval capabilities
III - Broad scale Implementation	**June 1993 to June 1994**	• Procure and install 18,737 student workstations • Procure and install 7,305 teachers and administrator workstations • Wire 7,305 classrooms and offices • Construct inter-building network within 80 school districts • Complete installation of 176 administrative systems • Provide professional development/training for 9,500 teachers, administrators, and clerical staff • Continue implementation of one pilot site and 8 model sites

	July 1994 to June 1995	• Expand KETS/ECN to include homes, higher education, libraries, and access to the Internet • Construct inter-building network within 96 school districts • Procure and install 18,737 student workstations • Procure and install 7,305 teacher and administrator workstations • Wire 7,305 classrooms and offices • Provide professional development/training for 14,500 teachers, administrators and clerical staff • Continue pilot and model site program
	July 1995 to June 1996	• Complete expansion of KETS/ECN to include homes, higher education, and libraries, with access to the Internet • Procure and install 18,737 student workstations • Procure and install 7,305 teacher and administrator workstations • Wire 7,305 classrooms and offices • Install 6,820 telephones • Install 273 PBXs • Provide professional development/training for 9,520 teachers, administrators and clerical staff • Continue pilot and model site program
IV - Complete Implementation	**July 1996 to June 1997**	• Procure and install 18,735 student workstations • Procure and install 7,305 teacher and administrator workstations • Wire 7,305 classrooms and offices • Install 13,640 telephones • Install 546 PBSx • Provide professional development/training for 6,000 teachers, administrators and clerical staff
	July 1997 to June 1998	• Procure and install 3,893 teacher and administrator workstations • Wire 3,651 classrooms and offices • Install 13,640 telephones • Install 547 PBXs • Provide professional development/training for 5,020 teachers, administrators and clerical staff
V - Ongoing Operations	**July 1998 to June 1999**	• Begin long-term maintenance/upgrade program

1999	• Continue on-going operations
July 1999 to June 2000	• Continue long-term maintenance/upgrade program • Continue on-going operations

PHASE	DATES	OUTCOMES/MILESTONES
I - Planning	**Sept 1991 to June 1992**	• Select KETS consultant/contractor • Adopt Master Plan for Education Technology • Integrate, synthesize, and finalize technical specifications • Develop school district education technology planning process • Design detailed plan for implementation of administrative systems • Develop KETS standards and timelines for education and technical assistance • Develop KETS public awareness program
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	July 1995 to June 1996	• Expand KETS/ECN to include homes, higher education, libraries, and access to the Internet • Construct inter-building network within 96 school districts • Procure and install 18,737 student workstations • Procure and install 7,305 teacher and administrator workstations • Wire 7,305 classrooms and offices • Provide professional development/training for 14,500 teachers, administrators and clerical staff • Continue pilot and model site program
		• Complete expansion of KETS/ECN to include homes, higher education, and libraries, with access to the Internet • Procure and install 18,737 student workstations • Procure and install 7,305 teacher and administrator workstations • Wire 7,305 classrooms and offices • Install 6,820 telephones • Install 273 PBXs • Provide professional development/training for 9,520 teachers, administrators and clerical staff • Continue pilot and model site program

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V - Ongoing Operations	**July 1998 to June 1999**	• Begin long-term maintenance/upgrade program • Continue on-going operations
	July 1999 to June 2000	• Continue long-term maintenance/upgrade program • Continue on-going operations

2.8 The Evolution of KETS

The Master Plan for Education Technology, an outgrowth of the KETS process initiated in June 1991, is designed to implement a world-class education technology system that will improve the quality of education throughout the Commonwealth. The implementation of KETS is a process that has evolved from the beginning and will continue to evolve for years to come. As a result, the Master Plan for Education Technology is a milestone in providing a view for the evolution of KETS to the next level of development. At the end of each phase of KETS, the Master Plan for Education Technology will be revised to accurately guide the evolution through the next phase. In this way, KETS is an evolving process that will result in improved education in the Commonwealth.

Table 2-2: KETS Major Phases

September 1991	• Selection of contractors to provide initial system design.
December 1991	• Three contractors develop and provide their design and cost estimates of KETS.
April 1992	• Council evaluates the three approaches and selects one contractor to implement KETS.
May 1992	• Council, LRC, and SBESE adopts Master Plan for Education Technology that reflects the best of all three contractors' work.
July 1992	• Implementation for Phase II initiated.
May 1993	• Evaluate Phase II and prepare for Phase III.
June 1993	• Implementation for Phase III is initiated.
June 1996	• Evaluate Phase III and prepare for Phase IV.
July 1996	• Implementation for Phase IV is initiated.
June 1998	• Evaluate Phase IV and prepare for Phase V.
July 1998	• Implementation for Phase V is initiated.

The Master Plan for Education Technology

The next milestone that is critical to the successful implementation of KETS is the development and approval of the Master Plan for Education Technology.

The process of Master Plan for Education Technology approval began during Phase I with the awarding of contracts by the Commonwealth to three firms selected to provide an initial broad strategy for KETS. These strategies were reviewed, and Digital Equipment Corporation was selected as the Consultant/Contractor to KDE.

The Consultant/Contractor, Digital Equipment Corporation, has worked with KDE to integrate the best of all three designs to create the Master Plan for Education Technology and to create a general implementation plan to meet the current conditions set forth in the Master Plan for Education Technology.

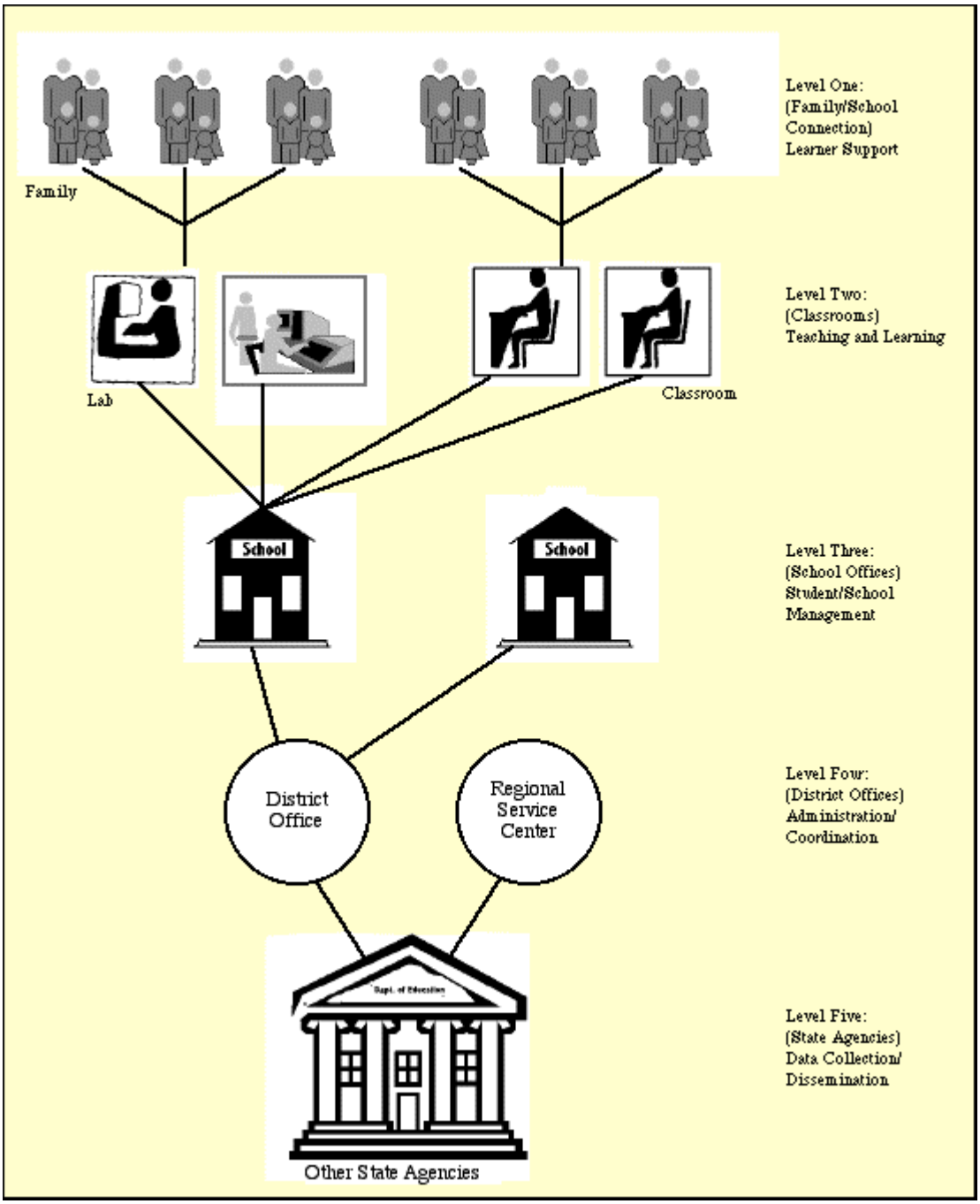
At this point, the Council for Education Technology (CET) will recommend the Master Plan for Education Technology for approval by both the Legislative Research Commission (LRC) and the State Board for Elementary and Secondary Education (SBESE). The Council for Education Technology, working with KDE staff, will expand the general implementation plan into a more detailed version. This detailed implementation plan and any significant updates will be submitted to LRC, user groups, and SBESE.

The development and approval of the Master Plan for Education Technology will be considered completed when the implementation plan has been finalized, when the plan has been recommended to KDE, and when the regulations necessary to affect implementation have been recommended to SBESE.

3.1 Conceptual Framework

KETS incorporates state-of-the-art technology and existing resources to enhance performance in the areas of instruction, communication, and administration. Conceptually, KETS will be implemented across five levels as illustrated in Figure 3-1.

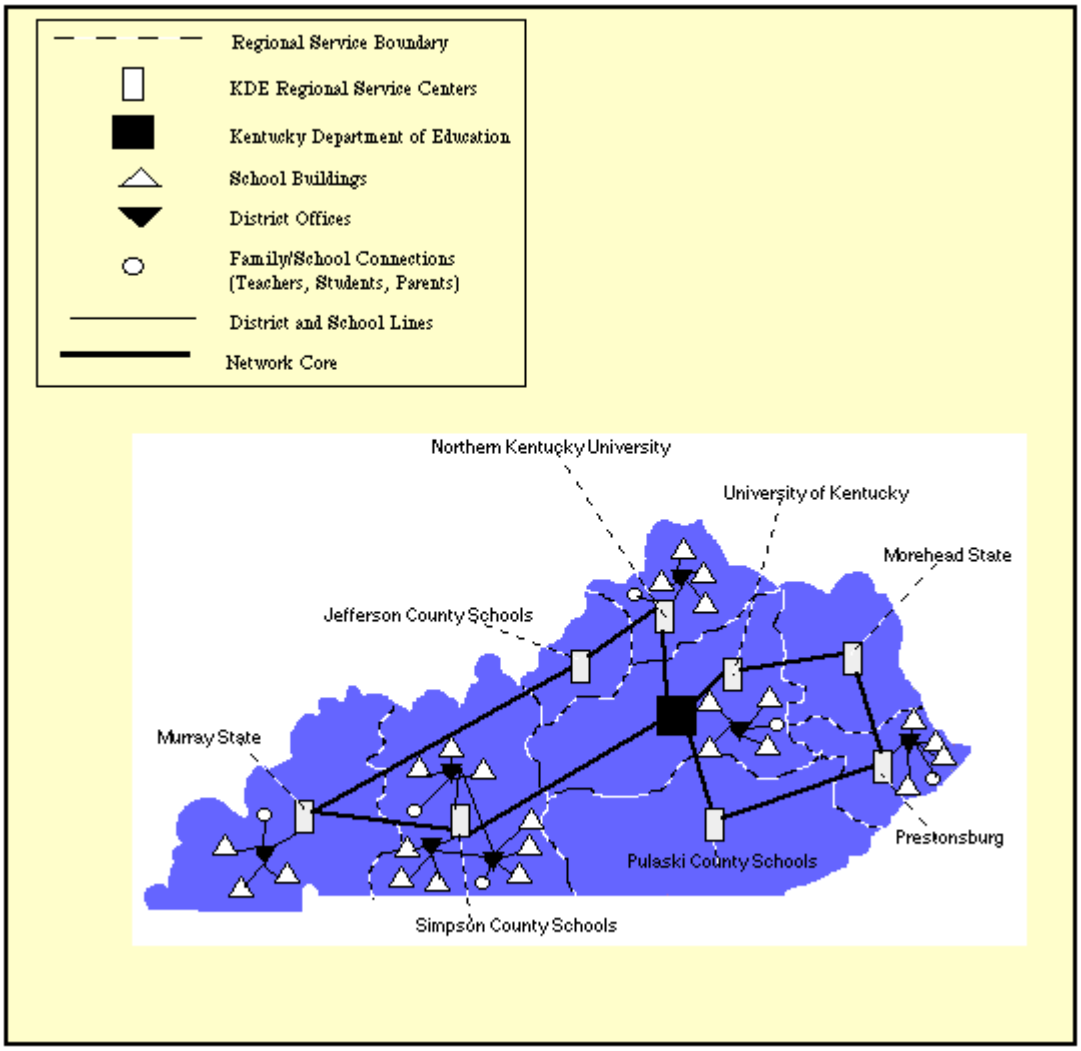
Figure 3-1: KETS Conceptual Overview



KETS consists of two major infrastructure components: the Education Communication Network (ECN), the highway over which the users will interface with each other and the information will flow, and the Education Information System (EIS), the application tools that assist students in learning, help teachers to teach and provide the entire local education community access to information and communications.

The ECN (shown in Figure 3-2) provides a layered, distributed network to ensure that failure in one part of the network does not adversely impact all schools in the Commonwealth.

Figure 3-2: Education Communications Network



The KDE Regional Service Centers (RSC) (shown in Figure 3-2) and KDE will have network management capabilities to monitor network performance and to rapidly identify and isolate any failures and restore service quickly. The design also accommodates the phased implementation of KETS connections from the ECN to the workforce development vocational/technical schools, to the Kentucky Higher Education Network, to the Kentucky Library Network, and to the worldwide Internet. This feature will open the myriad of worldwide educational resources available on these networks to any student, teacher, or administrator in Kentucky.

The ECN initially supports the communications needs of KETS while ensuring future compatibility with the Commonwealth Integrated Communications Backbone Network currently being developed by DIS. The ECN, as it is designed, connects the Regional

Service Centers (RSCs) and the KDE to each other as points on a ring. This design feature of the ECN results in two paths from each RSC to KDE, providing an alternative route between them in case a link in the network fails. During normal operation, both paths are used to reduce the load on the overall network. The district offices are connected to each other and to the RSCs in a similar fashion. The ring configuration ensures a cost-effective backup for the primary link and reduces normal network loading. The school district office will be connected to its schools using a ring or a star configuration as illustrated in Figure 3-2. The specific configuration chosen for each district will be determined based on the population and geography of the individual districts. Within the schools and district offices, a local area network (LAN) will connect all workstations to a file server and will provide access to KETS through the ECN.

The magnitude and innovation of the KETS initiative, clearly unparalleled in the history of education in the Commonwealth, will serve as a model for the nation. KETS innovation is best described by the underlying plan precepts or strategic decisions described below.

KETS Strategic Decisions

KETS Strategic decisions are as follows:

- KETS is *one Commonwealth-wide system* encompassing instruction and administration, thereby yielding a truly integrated education technology system and lower total costs.
- KETS is based upon *distributed* (or decentralized) *networks* of small to medium size computers, while allowing incremental implementation and preserving flexibility.
- KETS is a *tightly coupled network* to which every student workstation, teacher workstation, student/school management system, district office administrative system, and relevant state agency will be connected. This connectivity allows lower cost student and staff workstations and provides greater functionality than stand-alone computers.
- KETS is designed to *open systems standards* and allows a variety (limited by support and maintenance considerations) of vendor products to be used across the network.
- KETS is designed to *integrate data, voice, and video* technologies so that all these technologies can be routed over the same communications network.
- KETS encompasses *eight highly integrated major application subsystems*: Instructional Technology, Instructional Support, Student/School Management Services, Communications and Information Services, Administrative Computing, Commonwealth-wide Information, Office Services, and Network, thereby improving every aspect of the public school system.
- KETS employs a *common user interface*, meaning the look, feel, and functions will be consistent throughout the network, thereby reducing both initial and ongoing training costs.

- KETS is designed to be both *highly accessible* to staff, students, and parents and *highly protected* with security measures that restrict and detect unauthorized use but provide access to all stakeholders.

Adherence to these strategic decisions will result in the realization of a Commonwealth-wide education technology system that will bring about an equitable and efficient use of technology in the schools of the Commonwealth. These strategic decisions will improve teaching and learning and will enhance the operation of the public school system. KETS is essential to Kentucky's efforts to restructure its system of education and to realize the spirit of KERA.

3.2 Relationship Between KETS and Other KERA Initiatives

The relationship between KETS and other KERA initiatives are as follows:

- KETS will open up possibilities for information access and communication that is unmatched in any other educational setting.
- KETS will empower teachers by providing them tools that dramatically increase the information they can access and the media through which they deliver information.
- KETS will allow students to assume greater responsibility for their learning and empower them to learn by widening access to images, sounds, communication capabilities, and information that define the world in which they will compete.
- KETS will dramatically improve the administration of schools by providing administrators access to the information they require to make complex instructional and administrative decisions.
- KETS will enrich the community/school relationship by making school services more accessible to the community.
- KETS will open up a new environment where students, teachers, and administrators can do what humans do best - experiment, explore, and expand the realm of the human mind.

The Kentucky Education Reform Act, House Bill 940, Section 22, states that the Council for Education Technology is to develop a *"long-range plan for the efficient and equitable use of technology at all levels from primary school through higher education, including vocational and adult education. The plan shall focus on the technology requirements of classroom instruction, literacy laboratories, instructional management, distance learning, and communications as they relate to the Commonwealth's performance outcomes for students."*

The Education Reform Act further states that the plan shall *"outline the Commonwealth's five (5) year activities related to purchasing, developing and using technology to:*

- *Improve learning and teaching and the ability to meet individual student's needs to increase student achievement;*

- *Improve curriculum delivery to help meet the needs for educational equity across the state;*
- *Improve delivery of professional development;*
- *Improve the efficiency and productivity of administrators; and*
- *Encourage development by the private sector and local school district acquisition of technologies and applications appropriate for education.*

The five (5) year plan shall cover all aspects of education technology, including but not limited to, its use in educational instruction and administration, video and computer systems, software and hardware, multiple delivery systems for satellite, microwave, cable, instructional television fixed service, fiber optics, computer connections products, the preparation of school buildings for technological readiness, and the development of staff necessary to implement the plan."

The five-year plan is to include specific recommendations to the State Board for Elementary and Secondary Education for adoption of administrative regulations to establish and implement a uniform and integrated system of standards and guidelines for financial accounting and reporting which is to be used by all school districts.

Finally, the Education Reform Act requires an *"integrated technology-based communication system designed to provide comprehensive, current, accurate, and accessible information relating to management, finance, operations, instruction, and pupil programs which are under the jurisdiction of the Kentucky Department of Education."*

This Master Plan for Education Technology addresses all requirements of the KERA as they relate to technology.

3.3 Types of Technology

The scope and breadth of technology incorporated into KETS at the various levels of implementation are extensive. Figure 3-3 and Figure 3-4 provide a brief overview of the types of software and hardware that will be employed on KETS at the different levels. For example, to achieve a ratio of one microcomputer for every six students, the need is estimated to be 105,683 student workstations. Likewise, to provide the software applications to support administrative computing in the district offices requires a file server in each of the 176 offices as well as workstations and printer.

Figure 3-3: Software and Hardware Specifications

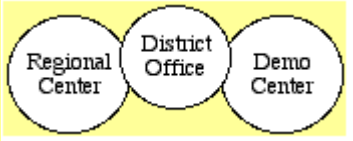
	Software	Hardware
	General Communications Voice Mail and Messaging	Telephones
	Electronic Mail, Electronic Forms Personal Productivity Desktop Publishing Valued Outcomes/Curriculum Frameworks Instructional Modules Library Resources and Databases Assessment Systems Classroom Management	Teacher and Student Workstations Telephones/PBXs Large Screen Video Laser Printers Assistive Technology
	Distributed Database Management Systems Electronic Mail, Electronic Forms News and Bulletin Board Office Management Student/School Management Systems	Local Area Network File Servers Administration/Clerical Workstations Laser Printers Telecommunications
	Distributed Database Management Systems Electronic Mail, Electronic Forms News and Bulletin Board Office Management Student/School Management Systems	Wide Area Network File Servers Administration/Clerical Workstations Laser Printers Network Control Systems Public Access Workstations (Public Library)

	Distributed Database Management Systems Electronic Mail, Electronic Forms News and Bulletin Board Office Management Student/School Management Systems	Database Engines Retrieval Systems Wide Area Networks

Figure 3-4 provides the types of applications and the scope of KETS implementation process, and presents estimates of the existing inventory/need.

Figure 3-4: Scope and Need Applications

	Applications	Scope	Need
	School Event Calendars Student Schedules and Attendance, Homework Voice Mail and Messaging Special Topic Bulletin Boards	Approximately 300,000 homes	Touchtone telephones in 75% of homes
	Classroom Management Instruction and Assessment Instructional Support Systems	Student to Computer Ratios • Elementary (6:1) • Middle (6:1) • High (6:1)	35,000 Portable Teacher Workstations 105,683 Student Workstations 34,100 Telephones
	Student/School Management Systems Voice Mail/Messaging	1,366 Schools	1,366 File Servers with Workstations and Printers 1,366 Private Branch Exchanges to control telephone traffic with Voice Main/Messaging capability

	Administrative Systems: • Purchasing/Budget • Management • Inventory/Warehouse • Fixed Assets • Transportation • School Food Services • Facilities Planning/Management • Energy Management • Opinion Research • Legislative Bill Tracking/Monitoring	176 School District Offices	176 File Servers that control the network of computers and store information, with Workstations and Printers
	State Reporting Instructional Materials Distribution Network Asset Management	Approximately six State Agencies 8 Regional Service Centers	9 Network Management Systems

3.4 Technology Specifications

The Master Plan for Education Technology includes specifications that provide the necessary detail to guide the KETS implementation. With these specifications, KDE, Local Education Agencies (LEAs), and the Consultant/Contractor can implement all aspects of the Kentucky Education Technology System. The specification documents address the detailed requirements in the following areas:

1. System Design
2. Blueprint/Selection Guide
3. Implementation Plan
4. Pilot/Model and Public Information Plan
5. Education and Technical Support Plan
6. System Operations and Management Plan
7. Systems Security Plan
8. Disaster/Failure Recovery Plan
9. Building Wiring Standards
10. Procurement Plan

The specification document represents the best of the work completed by the three (3) Information System Service Providers (ISSP). The Department has reviewed the documents produced by each of the ISSPs and selected the concepts, designs and specifications that best suit the Commonwealth's objectives. The specifications detailed in the Master Plan for Education Technology represent the blending and revision of the

Phase I deliverables based upon the KDE and KERA requirements to ensure KETS success. Detailed versions of these documents will be available by July 1, 1992.

The following sections provide summaries of the technical specification documents by describing the general approach, providing a summary of the specification, and discussing implementation where appropriate. Budget information is presented in Chapter 5.

3.4.1 System Design

3.4.1.1 General Approach

The System Design incorporates state-of-the-art technology and existing resources to enhance performance in the areas of student monitoring, instructional delivery, instructional management, administrative networking, communications, personal productivity, and information access.

3.4.1.2 Specification

The System Design is based upon evolving technological trends while at the same time supporting current models of instructional and administrative computing. The System Design places computing and communications power, as well as management of the resources, in the hands of schools, districts and regions by providing a comprehensive, layered, and distributed network system.

The first key component of the System Design is the Education Computer Network (ECN). Destined to take advantage of the Integrated Communications Backbone Network, a Commonwealth-wide communication backbone being designed by the Department of Information Systems, the ECN will initially be implemented as its own entity, using the Regional Service Centers located in close proximity to the schools. The network core of the ECN, linking the RSCs with KDE, will provide communication services throughout the Commonwealth and establish links to other worldwide information resources. A network hub located at each RSC will provide the districts and schools with direct access to the Commonwealth-wide network core. Each school and district office will have local area networks (LANs) of workstations that are fully integrated into the Commonwealth-wide Education Communication Network.

The second key component of KETS is the Education Information System (EIS). The focus of the EIS is:

- To provide students with a complete range of instructional software to assist in learning
- To provide teachers with a complete range of instructional support software to help in teaching
- To provide schools, districts, and KDE with a full range of administration software to assist in managing the business of education
- To provide the Commonwealth education community access to Commonwealth-wide information and communications services

3.4.1.3 Implementation

The System Design will be implemented in a fashion that is consistent with funding availability, solid systems implementation methodology, and the objectives of KETS. The ECN network core, reaching out to the districts, will be a Phase II activity, putting in place the communications links and tools for the Commonwealth education community. The pilot site concept, discussed in a later section of this chapter, will be used to build the initial implementation of the administrative systems and common user interface. In parallel with this activity, work may begin within the schools and districts on the detailed design and implementation of the district-to-schools ECN and for school LANs. Adjustments to the design will be made as required using the pilot site experience. As district technology plans are approved, the ECN and LANs will be implemented at the district and school level.

This phased implementation minimizes the technical and cost risk of KETS while ensuring implementation as rapidly as funding resources and planning are available. The detailed design and necessary technical components of the procurement documents will be completed by the Consultant/Contractor.

3.4.2 Blueprint/Selection Guide

The Blueprint/Selection Guide is designed to help local districts to develop Master Plan for Education Technology and integrate education technology into their school and district programs.

3.4.2.1 General Approach

A critical component of realizing the vision of KERA is the use of the Blueprint/Selection Guide. KDE will provide several resources to school districts that enable them to carefully plan their participation in the KETS network. Printed planning guides, regional training seminars, and technical support services will be offered to all Kentucky school districts.

3.4.2.2 Specification

The Blueprint/Selection Guide will:

- Help schools to use technology that supports the Kentucky Education Reform Act initiatives and is consistent with the valued outcomes for the improvement of education.
- Present instructional technologies that will serve as the foundation of KETS efforts, as they represent the technology link to the teachers and their students.
- Ensure selection of technology that is fully compatible with the KETS System Design, while meeting the instructional and administrative requirements of educators and students.
- Serve as a guide for teachers and districts to plan for and procure instructional technologies. The Guide provides a model for guidance and development of district technology plans; identifies the most promising technology solutions for the attainment of

educational goals; and specifies appropriate equipment and instructional strategies for incorporation into the curriculum at various instructional levels.

- Explain and guide the six-step technology planning process, shown in Figure 3-5, for the districts to follow.
- Establish standards for upgrading and networking of existing school district equipment. Upgrade plans are required as a prerequisite to funding for new purchases.
- Assist districts in completing the planning process and producing a plan that clearly articulates the district's goals and objectives for the use of technology and identifies components required to realize the district's vision. Included will be computers and networking hardware; printers, monitors, multimedia and other equipment; professional development plan, maintenance and operation plans; budget; software for both instruction and instructional support; as well as specialty applications and adaptive/assistive devices for special populations. The local school district education technology plans will serve as the basis for Offers of Assistance to the districts. The offers of assistance process is described in Section 5.2.

3.4.2.3 Implementation

The Consultant/Contractor will revise and expand the Blueprint/Selection Guide. Additional guidance resources including a planning template, planning guidebook, and planning video tapes will also be provided to school districts early in Phase II. An example of these resources can be found in Appendix C, "Technology Planning Checkpoints." The process for carrying out school and district KETS planning is displayed in Figure 3-5.

Figure 3-5: Local Educational Technology Planning Model

Step 1 Initial Activities	Step 2 Information Gathering	Step 3 Action Plan Development	Step 4 Approval Process	Step 5 Implementation Process	Step 6 Evaluation Process
• Identify community of stakeholders • Enlighten and share vision with stakeholders • Form district technology committees • Initiate formation of school technology committe	• Investigate community resources and partnerships • Survey educational technology attitudes/skills/literacy • Inventory existing hardware/software resources • Review current educational technology initiatives • Identify current curriculum strengths and weaknesses • Identify	• Develop district technology goals • Research/select/desired learning outcomes/strategies • Create school level vision based on outcomes/strategies • Develop goals and objectives leading to vision • Distribute goals and objectives to create curriculum-specific action plans • Prioritize curriculum-specific action plans to create school action plan	• Submit school action plans to district for integration into district plan • Seek approval of superintendent and school board for district plan • Seek validation of district	• Upgrade and reposition existing resources • Procure new equipment • Receive/install/test hardware and software • Conduct staff development activities • Implement initiatives according to action plans by priority	• Review and revise district wide evaluation procedures • Review and revise school level evaluation procedures • Identify evaluation activities, tools, strategie

e(s) • Develop timelines for school level and district action plans	current condition of building wiring • Review valued outcomes		plan from KDE • Receive acknowledgment of unmet need and Offer of Assistance from SFCC • Identify source of matching funds		s, timelines and milestones • Conduct evaluation activities at school and district levels • Process evaluation information for future planning

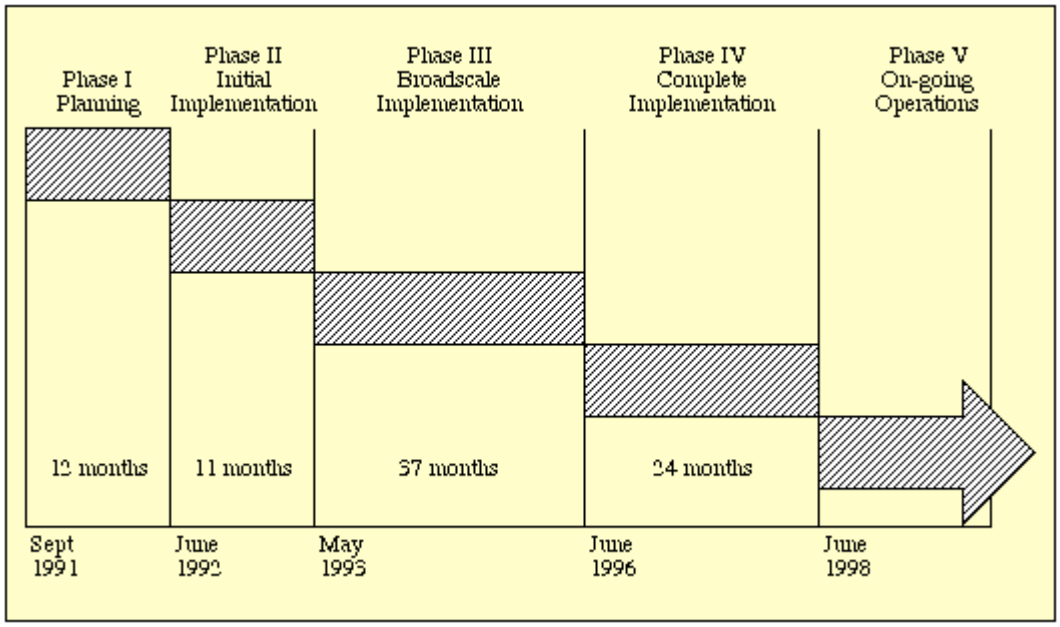
3.4.3 Implementation Plan

3.4.3.1 General Approach

Effective project management and delivery of quality technical assistance in the many KETS areas will require a structured and phased approach to implementation. For each implementation phase, the plan addresses the stated objectives, the tasks required to achieve the stated objectives, project schedules, and resource estimates for the effort.

The implementation plan will be used to guide project management and technical assistance efforts in support of KETS planning, training, deployment, implementation, and continuing operations/maintenance. The implementation plan consists of a five-phased approach which provides KETS components and application functions for students, teachers, and administrators at the earliest stages of implementation. The following general implementation schedule (Figure 3-6) illustrates the implementation phases and associated timeframes.

Figure 3-6: General Implementation Schedule



3.4.3.2 Specification

The implementation plan supports the Master Plan for Education Technology and the technical specifications, which have been adopted by the Commonwealth, and also provides a detailed direction for program initiation. The planning and initial development of a KETS public awareness program will provide a vehicle for communicating the intent and progress of the KETS implementation as well as obtaining stakeholder "buy-in." These efforts will occur in Phase I of the implementation plan. The implementation of this program will occur in Phase II.

Phase II will initiate the KETS implementation at all levels and implementation will continue through Phase IV. The KETS Consultant/Contractor responsibilities during the implementation phases will include the following:

- Project manage and oversee all KETS activities.
- Train and assist districts in the development of technology plans required for Offers of Assistance.
- Develop professional development and training programs and materials.
- Assist in the training and certification of regional planners and trainers.
- Provide requirements analysis and design consulting for the development and implementation of the administrative database, common user interface, and district administrative systems, building wiring, and KETS networking.
- Assist in developing criteria and identifying locations for the Commonwealth pilot and model sites for demonstrating KETS technologies.
- Monitor and update implementation plans resulting from pilot and model site implementations.

The implementation of KETS is an ongoing process requiring continuing maintenance and support. Long-term maintenance, support, and upgrade plans will be developed to ensure that KETS is kept current as technology evolves. These plans will serve as the basis for the continued operations of KETS.

The implementation approach is based upon the following strategies:

- Prepare and educate the community and KETS users about the implementation of technology through public information programs, technology planning training, and establishment of the pilot and model sites.
- Deliver educational technologies and training to students and classroom teachers in the earliest possible stages of implementation.
- Establish the required communications and application systems between KDE and districts to address and satisfy mandated requirements for transaction reporting.
- Empower the educator with technologies and technical assistance early in the implementation with continuing support throughout the effort.

3.4.3.3 Implementation

KETS will be implemented using a phased approach and will incorporate the established implementation strategies as detailed in the implementation plan. Implementation efforts will focus on maximizing the current technology and will ensure the implementation of a

system, which addresses the Commonwealth's strategic decisions described in Section 3.1.

3.4.4 Pilot, Models, and Public Information Plan

3.4.4.1 General Approach

The strategy to develop a pilot site and eight (8) model sites, strategically located across the Commonwealth, will demonstrate how KETS will bring to life the vision of KERA. The pilot will give all stakeholders in the education process a chance to actually see, touch, and use the technology as it is being developed and as it becomes available to the schools, in a manner that provides a consistent, confident, and high quality message. This exercise will also give those sites selected as a pilot and models national visibility, enhanced vendor support, funding priority, and technology planning assistance. This strategy will ensure that the sites meet the objective of fully and rapidly demonstrating KETS.

3.4.4.2 Specification

To support the approach, the following strategy has been adopted:

- A state pilot will be implemented, based upon defined selection criteria that will serve as a prototype of the KETS program. This system will minimize risks of initial site implementation and demonstrate incremental successes.
- Eight model sites will be developed in those locations that meet the selection criteria and are easily positioned to quickly receive proven technologies from the state pilot. These sites could involve various organizations or partnerships of organizations. Program funding for these model sites will not exceed levels of standard offers of assistance.
- A public information program will be conducted by the local schools to encourage and publicize participation by all user and audience groups.

Given this strategic direction, multiple roles will be expected of the pilot and model sites in order to maximize the effect of the investment of public funds. Expectations for the pilot and models include a forum to:

- Provide a focused and consistent technology vision
- Disseminate effective teaching and learning practices using technology
- Model excellence in advanced and innovative learning and administrative technologies
- Perform acceptance testing of hardware, software, and communications technology, database conversion, and creation techniques

- Disseminate successful organizational, planning, and procurement practices for technology implementation
- Review and select instructional software modules for commonwealth-wide licensing
- Model high quality professional development programs

3.4.4.3 Implementation

In view of the magnitude of implementation across all five levels of the Master Plan for Education Technology at the pilot site, the impact on resources and participants within the initial selected site will be high. This will be minimized by using a phased strategy to recognize successes as each installed technology has been integrated into the current operations of the selected site. Implementation priorities will address the two technical foundations of the KETS system, the Education Communication Network, supported by the equipment listed in Table 3-1, and the Educational Information System (Instructional Technology, Instructional Support, Administration Computing, and Communications and Information Systems).

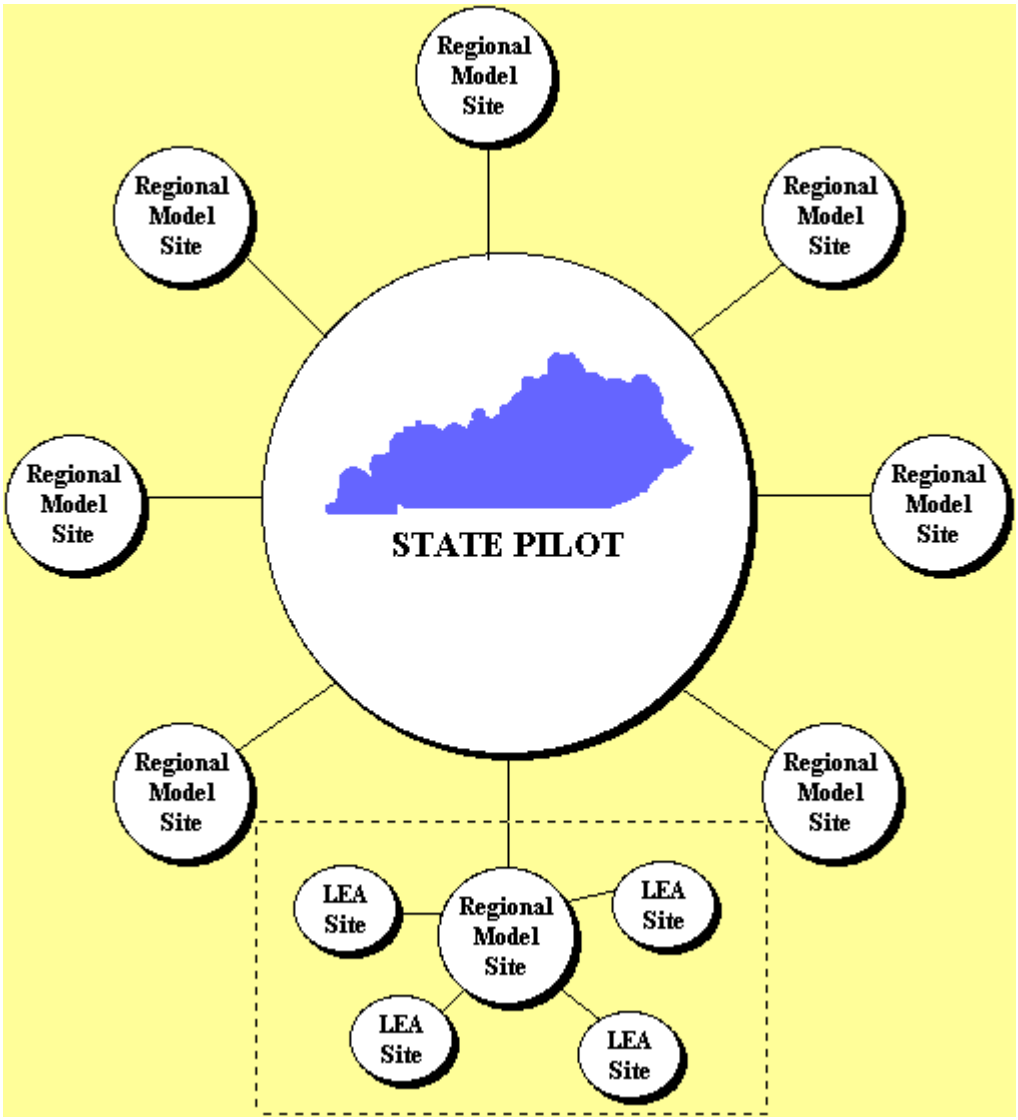
Table 3-1: ECN Support Equipment

Technology	State Pilot	8 Model Sites
Student Workstations	1200	3200
Teacher Workstations	400	1200
Office Printers	16	40
Classroom Printers	400	1200
Phones	50	160
Admin/Clerical Workstations	80	200
Classrooms Wired	400	1200
School Offices Wired	64	160
District Office Rooms Wired	16	40
Schools-to-District Network Links	16	40
District-to-RSC Network Links	2	8

During Phase II, priority technologies will be implemented within the State pilot. Once technology effectiveness is ensured, those that meet local and regional requirements will be disseminated to appropriate model sites. In turn, the model sites will become a

regional focal point for disseminating technology to the remaining LEAs, as shown in Figure 3-7.

Figure 3-7: KETS Pilot Implementation Strategy



3.4.5 Education and Technical Support Plan

3.4.5.1 General Approach

Successful use and operation of KETS is critically dependent on training of users, technical support provided to operate and maintain the equipment, and user assistance provided by a "Help Desk." Of particular importance is initial training and exposure to the system. Many members of the educational community will not have used the types of technology included in KETS. Very few will have experienced the information processing or communications power of KETS. This lack of exposure will require significant education for KETS users. Special attention will be paid during initial

professional development efforts to address user fears, concerns, and possible resistance to change. The focus, while introducing users to the system, will additionally be to dispel myths, reduce anxiety, and communicate the benefits the user will realize as a result of using KETS.

Communication is an essential element of overall planning for professional development. Initial training will be designed to ensure a common language among Kentucky educators when discussing KETS and to create conditions favorable for a high degree of professional interaction. This communication will consider the audience and what it most needs to know, based on role and levels of responsibility.

KDE's professional development approach will make maximum use of existing resources to provide quality, cost-effective training. Local consortia, co-ops, and private non-profit organizations who are currently networked in the state for training and resource support and who are experts in this area will be asked to participate. Vendors will be asked to provide training credits as part of the procurement of their equipment. Kentucky Educational Television (KET) broadcast capabilities, supplemented by local facilitators, will be utilized to provide introductory and refresher training. Model and pilot site staff will be asked to provide assistance with training design, development, and delivery. Kentucky Institutions of Higher Education (IHE) will be asked to collaborate with KDE to offer training courses, to assist in development of training materials, and to define KETS and related technology-based course requirements for upgrading state pre-service certification and recertification requirements.

Districts will be expected to use some of their nine instructional days of professional development time to provide for the additional training required for KETS. Where relevant and appropriate, KETS and related technology-based learning outcomes will be incorporated into in-place educational staff development programs. Initial administrative understanding and support will make these arrangements easier to accomplish.

Successful implementation of KETS will require an environment of readily available ongoing support. Technical support will be coordinated by the Regional Service Center KETS Coordinators and available through District Technology Coordinators and School Information Technology Specialists. Assistance to the users on the use of software will be provided by a KETS "Help Desk" at KDE as well as by trained school and district professionals.

Figure 3-8 provides an overview of the KETS professional development/training strategy, approach, and requirements.

Figure 3-8 KETS Professional Development/Training

	Strategy/Approach	Requirement
	Public demonstration centers Kentucky Educational Television Public/Private Partnership-based information dissemination program	450,000 parents 3 million non-parents Businesses Community service organizations
	Computer-based training Kentucky Educational Television Regional professional development consortia Model sites	35,000 Teachers 634,000 Students
	Computer-based training Regional professional development consortia Model sites	2,414 Administrators 2,432 Clerical support staff
	Computer-based training Regional professional development consortia KDE direct (train-the-trainer)	3,164 Administrators 1,530 Clerical support staff
	Computer-based training KDE direct (train-the-trainer)	550 KDE staff

3.4.5.2 Specification

KETS professional development will be provided for at three levels: basic operations, use of applications, and job proficiency. The following proven methods/principles will be followed:

<u>The Model for Professional Development</u>

- A train-the-trainers model will ensure a core of highly trained professionals to conduct initial training. Subsequent training will be managed by districts as a product of their technology plans.
- The core training team will include technical staff who will operate KETS, the RSC KETS Coordinators, key KDE staff, key model

and pilot site staff, key IHE and district staff, and other potential service delivery providers.

Design and Development of Training

- Identification and selection of training content will be based upon data gathered from the Strategic Technology Planning assessment.
- The training focus will be on instructional and administrative tasks rather than on technology and will include the hands-on uses of technology that will serve curricular and administrative goals as well as the integration of the two.
- Training modules will be developed through assistance from vendors, IHE, pilot and model site staff, consultants, KDE, district representatives, consortia and co-ops, KET, private non-profit organizations, and other key stakeholders in KERA and KETS.
- A systems approach for module development will be established. A training module template will be designed to ensure a consistent format for development of all training modules and supporting materials, such as manuals and videos, for each specified area.
- A variety of modes of instruction will be used to address individual preferred learning styles. These models will include, but not be limited to, group instruction, individual tutorial modules, hands-on activities with trainer support, opportunities for unstructured access to use KETS in a private setting, interactive video, instructional television via KET, and computer-based instruction delivered on-line over KETS.
- KDE will approve all basic training modules and related courses to ensure consistency, quality, and continuity.

Delivery of Training

- Training will be conducted by job-alike educators who are proficient in teaching adults.
- KDE will establish a process for certifying trainers to ensure quality and consistency of delivery of training.
- Training will allow adequate time for trainees to learn, practice, and apply new concepts and applications.
- Training will be offered only when trainees have adequate access to hardware and software to allow for immediate follow-up practice and application of what was learned.
- Training will be sensitive to individual needs and schedules.
- Training will be flexible to allow trainees to use what they have learned in ways appropriate to their individual role responsibilities.
- Libraries of training modules, videos, and other training materials will be available for loan and/or copying at the Regional Service Centers.

3.4.5.3 Implementation

The Consultant/Contractor will help develop initial professional development course requirements and desired learning outcomes. This will include program awareness as well as system training built around the elements of change and ongoing support. Assistance to KDE in preparing statements of work, establishing a systems approach for module development, designing a module template, and defining trainer certification criteria will also be provided.

The professional development modules will be tested at the pilot site to determine the most effective models and approaches and to assess the success of aligning training with the desired learning outcomes. Necessary changes identified by the pilot will be incorporated. Professional development will then proceed in accordance with the principles stated earlier and the implementation schedule.

The KDE "Help Desk" will be staffed after the ECN core is implemented and districts are connected. The pilot site will also provide an opportunity to pilot the Help Desk operations.

Other operational personnel will come on board as required. Technical support to the districts will be coordinated by the Regional Service Center KETS Coordinators and by district Technology Coordinators and school Information Technology Specialists.

No two school systems will be expected to utilize KETS in exactly the same way. Based upon KERA support of site-based decision-making, district needs assessment, technology plans, and evaluation of and revisions to both will provide the foundation for ongoing professional development specific to local district needs and priorities. District and building-level administrators will monitor KETS implementation and provide professional development essential to ongoing successful implementation of both KERA and KETS program goals. Professional development will be an evolving element of each district technology plan with an agenda determined, at least in part, by information gathered through evaluating the implementation of KETS.

KDE will require and evaluate district technology plans and will focus on how needs were identified and how they will be addressed through district management of professional development. It should be an evaluation of the process the district used rather than a checklist evaluation, identifying evidence of solid planning.

Data presented in *The Nation's Report Card: Computer Competence - The First National Assessment* points out the positive relationship between computer ownership and computer competence. Clearly, a great deal of learning about KETS, for staff as well as for students and their parents, will occur outside of the classroom and school day. Recognizing its responsibility to help parents and staff with securing opportunities to learn about KETS from their homes or outside of the school building, KDE will support district endeavors to see that teachers have access to portable computers after completing initial training and that vendor discounts and other incentives for educator and family purchases be made available.

The future of successful KETS utilization will be a result of well-planned professional development. While the technology will provide the possibilities, the human choices made in planning, not only for system design and installation but for ongoing evaluation

and training, will determine the end product. The greater the plan for a powerful KETS system and resources, the greater the investment must be in organizing and coordinating its use.

3.4.6 Operation and Management of the Education Communication Network

3.4.6.1 General Approach

The KETS network and the systems tied to that network are a competitive asset for education. KETS is a landmark initiative that will impact hundreds of thousands of Kentuckians, with the opportunity to illuminate the worldwide opportunities for educational excellence. The KETS distributed network environment is made up of a variety of equipment from multiple hardware and software vendors.

Within the KETS network, there will be varying levels of network and system management. KDE will have the following responsibilities:

- Provide communications bandwidth.
- Set network policies.
- Manage the network.

The support of the KETS network will require network management specialists. Recommended staff at KDE for operation and management of the ECN (once installation is complete) is one part-time network system manager for the wide area network (WAN) with one network management workstation. This requirement will be met by assigning this additional duty to current KDE staff.

The support of the KETS network will require that network management specialists be housed at the Regional Service Centers. The regions will provide first level network fault isolation assistance to the districts and schools. Recommended staff at the regions for ongoing support (once installation is complete) is one part-time network system manager for the wide area network (WAN) within their region. They will be provided a network management workstation to assist in their activities. This staffing requirement will be met by assigning this additional duty to current RSC staff.

Each district will need one staff member who can manage the district office local area network (LAN) as well as the wide area network (WAN) from the districts to the schools. The recommended staff at the district for ongoing support (once installation is complete) is one part-time District Technology Coordinator to manage the district office local area network (LAN) and the Wide Area Network from the district to the schools. This staffing requirement will be met with existing district staff.

Each school will need to have one staff member who can manage the school local area network (LAN). The recommended staff at the school for ongoing support (once installation is complete) is one part -time Information Technology Specialist to manage the school local area network (LAN). This staffing requirement will be met with existing school staff.

At the discretion of the districts, they may form individual cooperatives for network planning and management, request the Regional Service Center to provide network management, or support all district network management needs internally.

The KETS network managers' responsibilities include a wide range of activities, including:

- User education
- Help desk operation
- Network performance measurement and optimization
- Training of technical staff
- Monitoring security policies
- Identifying, isolating, and fixing faults
- Daily operations
- Maintenance
- Disaster recovery

3.4.6.2 Specifications

The following three methods will be used to manage the KETS network:

- Automatic network management to identify network faults
- Staff utilizing management tools for troubleshooting and analysis
- Evaluation of gathered information to determine correct actions

Information will be automatically provided to the network management station to allow the KETS network manager to perform the following functions:

- Network performance monitoring
- Network status monitoring
- Network configuration management
- Problem alerting
- Diagnostic activation and reporting
- Administrator reports on network history

3.4.6.3 Implementation

As the network is expanded throughout the regions within the Commonwealth, proper management and operations of the network is essential. The skills and expertise of the ECN management and operations staff will be expanded through proper training and experience.

3.4.7 System Security Plan

3.4.7.1 General Approach

As more and more of the business of education in Kentucky is done with the help of computers, security of those computers and the data they contain becomes a pressing issue. Data security is essential to ensure compliance with the legal and ethical

requirements of such laws as the Privacy Act of 1974. Physical security is essential to protect the investment the Commonwealth will make in KETS. A fundamental KETS principal, however, is easy and open access to all applications and services that are appropriate for a given user. To balance these requirements, a plan that fully addresses all aspects of security must be implemented.

There are four types of electronic threats a security plan must address: accidental loss or damage of data by authorized users (an inadvertent deletion of a record or file), deliberate transgressions by authorized users (disgruntled employees), probing by unauthorized users (occasional hackers), and penetration attempts by unauthorized users (viruses). Also, there is always the issue of physical threats to equipment by theft or vandalism.

3.4.7.2 Specification

To address all threats to KETS security requires a combination of physical controls, software controls and education. Physical security is the starting point of the plan. As it is addressed in the Security Plan, KETS physical security includes the following measures:

- School and district file servers will be installed in areas that limit physical access to authorized personnel. All student performance data will be stored on these machines as a first step toward its protection.
- Printers that are used for output of protected information will be installed where access to the printed matter can be controlled.
- As a first step towards protection from unauthorized network access, network components will be secured in locked wiring closets.
- Portable systems will be assigned to personnel who will be required to adhere to detailed policies for equipment protection.

Given the sophistication of technology used in attempts to breach the security of systems, such as KETS, much more than physical security is required to ensure the protection of the KETS equipment and information. Current software security technology will be used to ensure that:

- All information and applications (known collectively as resources) that are a part of KETS will have an electronic list of the individuals within the Commonwealth educational community (or KETS users) who have a need for that resource. As an example, this "tagging" of information will be done to such a level that an individual piece of information within a record will be protected from a user that has the right to see the remaining information contained in that record.
- Every user, from student to commissioner, will be uniquely identified to the KETS environment. This provides several opportunities for security control. As individuals access the KETS environment, a determination will be made as to what applications

menus to display to that user. Menu level security eliminates unauthorized access attempts simply based on the curiosity of the user.

KETS will be able to determine if the individual has the authority or the need to access a resource. If access is requested from an unauthorized user, access will be denied, the attempt will be logged, and KETS management will immediately be notified of the access attempt.

- Software will assume responsibility for ensuring that user access information is kept consistent with the highest levels of security practices. Password changes will be forced on a periodic basis to ensure that passwords that have become know to unauthorized users become useless. Password length and selection will be monitored to ensure that standard means of "guessing" passwords by intruders will be thwarted.
- Access to external ports for home and remote access will be monitored for unauthorized access. Specifically, if unsuccessful attempts are made to gain access to KETS through a dial-up port, the port will be disabled and KETS management will be immediately notified of the access attempt.
- Anti-virus programs will be located on each workstation to prevent the spread of viruses. As a floppy is inserted into the workstation, the anti-virus program will scan the floppy and ensure that no viruses will be introduced into the KETS environment.
- To ensure the integrity of the information available on KETS, network backup procedures to save all key information will be a part of standard operations. Additionally, if it is detected that a system has not been made available for network backup for a period exceeding one week, KETS management will be notified to ensure that the information has been protected.

Education, the third key component of the Security Plan, calls for a three-part strategy:

- The general KETS awareness training, a training module planned for the teacher and administrator community during the first year of Phase II will include a security module to introduce basic security concepts to teachers and administrators across the Commonwealth.
- More detailed security training will be provided to those individuals chartered with direct support of the KETS environment. Training will include, but not be limited to, the Information Technology Specialists, District Technology Coordinators and staff of the Regional Service Centers.
- A set of KETS security guidelines and directives will be published for distribution to students, teachers, administrators, and clerical

support staff. The purpose of these guidelines is to educate and provide guidance on acceptable security practices for the general KETS user community.

3.4.7.3 Implementation

The Information Technology Specialists at the schools and the District Technology Coordinators will assume security responsibility at district and school level. Their role will be to ensure that the issue of security is addressed in the technology plan of each district, that the plan is implemented as specified, and that concerns and issues with respect to security are brought forth.

Training for those directly involved with the security of KETS at all levels (Information Technology Specialists, District Technology Coordinators, Network Managers) will be accomplished with video and computer assisted training. This training will include physical and software security procedures and practices for both classrooms and offices. Security guidelines will be developed and published which will emphasize user responsibilities for use of school assets.

The security guidelines and procedures will be developed by the Consultant/Contractor in consultation with KDE. The procedures will be implemented at the pilot site and modified, as required, based on the pilot experience. A suitable security plan will be a requirement for connection to KETS by a district or school. If experience shows that the security provisions are not sufficient, there are further, more expensive security technologies such as those published in the "Orange Book" and used by the secure branches of the U.S. Government that can be implemented.

3.4.8 Disaster/Failure Recovery Plan

3.4.8.1 General Approach

The computers and communications systems of today are very reliable and can be made more reliable through proper management. Reliability is usually measured by how much of the time a system is available to perform its function. Typically, each major system is expected to have the indicated availability under the following circumstances shown in Figure 3-9.

Figure 3-9: System Availability

System	Available	Minutes Unavailable /40-Hour Work Week	Minutes Unavailable /1560-Hour School Year
Unmanaged	90.0%	240	9,360
Managed	99.0%	24	936
Well Managed	99.9%	2.4	93.6
Fault Tolerant	99.99%	.24	9.36
High Availability	99.999%	.024	.936

A component may become unavailable as a result of hardware, software, or human error. Business systems running normal applications typically have availability ratings between 99% and 99.9%. Fault tolerant systems usually have one or more of their critical components duplicated; if one part fails the other will continue to function. High availability systems typically have all major subsystems duplicated, with sophisticated software constantly monitoring the health of the system, and comprehensive operation and maintenance procedures to minimize disruption through human error. Telephone systems are examples of high availability systems, with a design goal of two outage hours in 40 years. Recent well-publicized failures in telephone networks show how difficult it is to maintain high availability systems. Considerable cost and management effort is required to increase availability from one level to the next higher level.

While the overall design goal for the KETS has been established at 99.9% availability (or well-managed), it is more appropriate to talk about the availability design goals for each level of KETS, as shown in Figure 3-10. While each level of KETS is extremely important, the tolerance of each level for downtime varies. The levels of availability indicated will be accomplished through redundancy of some of the most error prone components (such as communication lines), procurement of reliable equipment, and proper attention to operational procedures, including fast recovery after major failures or disasters.

Figure 3-10: KETS Availability

KETS Levels	Available	Minutes Unavailable /40-Hour Week	Minutes Unavailable /1560-Hour School Year
Level 1 Family/School	High Availability	.024	.936
Level 2 Classrooms	Managed	24	936
Level 3 Schools	Managed	24	936
Level 4 District Offices	Managed	24	936
Level 5 State Agency	Well Managed	2.4	93.6

3.4.8.2 Specification

The specific areas of concern that were targeted in the development of the KETS System Design and in the Disaster/Failure Recovery Plan include:

- Loss of an ECN communications link through a phone line outage
- Loss of an ECN communications link through a hardware failure of ECN communications equipment
- Loss of information through an inadvertent error by a KETS user (accidental deletion of a file or record)
- Loss of information through a hardware failure of one of the EIS systems or storage devices
- Loss of computing capacity through a hardware or software failure of the EIS systems

The system design provides significant recovery capabilities throughout the network. The ECN configuration provides redundant paths so connectivity is retained even if one connection is broken. The EIS computers at the district level will provide backup for files and processing at the school level. Finally, and most importantly, the network server in the school will provide file storage and backup for student, teacher, clerical, and administrator workstations. Dialup capabilities provide additional redundancy. The distributed system design eliminates a single point of failure.

Each Regional Service Center node and KDE node will have network management capabilities. This capability provides for monitoring and fault isolation if problems should occur on the ECN. Disaster/failure recovery planning will also ensure the public telephone network companies do not route that intended redundant paths through a single point of failure.

3.4.8.3 Implementation

Successful disaster/failure recovery requires contingency planning. As the system design is implemented, this planning will take place at KDE, the eight (8) Regional Service Centers, and district/school levels. Additional guidelines for disaster/failure recovery plans will be developed by the Consultant/Contractor. The training for the district's education technology coordinators will also include a section on contingency planning.

The initial cost of disaster/failure recovery will be low, consisting primarily of the staff resources to accommodate disaster/failure recovery designs and to do contingency planning. As KETS use increases, additional planning will be required to identify critical data and establish backup procedures. Continued monitoring of the ECN will be required to ensure the intended redundancy remains. Finally, as KETS use increases, recovery drills will be conducted to ensure that a failure will not have catastrophic results.

3.4.9 Building Wiring Standards

3.4.9.1 General Approach

An effective communication link is necessary to provide easy access from the workstations to KETS services. The Building Wiring Standards meet this requirement. It supports all KETS standard workstations and services as established in the technical specification documents. These standards include Ethernet, token-ring, Arcnet and most other data standards, as well as all common voice and video communications standards. The standard is based upon communications industry standards that ensure a long, productive life.

3.4.9.2 Specification

The KETS Building Wiring Standards use simple connectors and low-cost unshielded twisted pair cabling in the classrooms and offices for data communications. This approach makes connecting any voice communication or equipment in the classroom, such as a student workstation, as simple as plugging in a home telephone. The cabling terminations are hidden from the user in remote communications closets. The closets are connected together with high performance fiber optic cabling and are microprocessor-controlled.

The Building Wiring Standards describe the physical topology of the installed cabling as a physical star. The cables will originate in central communications closets and distribute to lower level closets and work areas. This "star" wired topology has been selected for its flexibility, manageability, and has its roots in popular industry and international standards for building wiring.

Video integration with voice and data is not cost effective at this time. Consequently, the coaxial cable existing in many buildings will be used for video. Additional coaxial

cable will be installed where needed. The industry trend is to use cell relay transmission of voice, data, and video. New standards are being developed to provide this service over unshielded twisted wire pairs. All termination equipment will allow future incorporation of frame relay protocols that can integrate voice, data, and video when the service becomes widely available. This approach provides a flexible network capable of serving all voice, video and data needs for education far into the 21st century.

3.4.9.3 Implementation

Building wiring will be implemented in a phased approach requiring specialized skills in each phase. These steps include:

- Planning - the identification of building wiring needs will be part of each district's educational technology master plan.
- Design - the design process identifies construction and materials specifications.
- Installation - the installation process implements this standard.

The KDE will qualify service contractors and LEA personnel to assist the districts with building wiring. KDE will also provide assistance with quality review for each phase. This approach will ensure that all districts are equally prepared to take advantage of the building wiring investment, and that wiring will be performed in a quality manner for a cost-effective price.

Additionally, KDE will furnish copies of the building wiring standards to the School Facilities Construction Commission and make copies available to all architects and builders in the Commonwealth.

3.4.10 Procurement Plan

3.4.10.1 Acquisition

The acquisition process will provide a competitive environment that focuses on obtaining the best price on required resources. To ensure that the Commonwealth maximizes the resources available, both state and local, the KDE has adopted the following process for the acquisition of technology:

- Commonwealth procurement guidelines, policies, and procedures will be followed to select the appropriate procurement alternatives.
- The Consultant/Contractor will finalize requirements and designs.
- KDE and the Finance and Administration Cabinet (FAC) will develop and issue procurement documents.
- KDE, FAC, and the Consultant/Contractor will evaluate proposals, negotiate with contractors, and select KETS components.
- The Council for Education Technology, working with KDE and the contractor, will evaluate, select and recommend KETS components for purchase.

This process will result in efficient and effective functional requirements definition and refinement, accurate evaluation of proposed products and services, and the selection of appropriate resources for integration and will also allow KDE and LEAs to maintain current investments in existing resources and provide users with a selection of resources from which to purchase.

For KETS hardware and software components that are to be acquired with 100% KDE funding, Invitations for Bid (IFBs) will be issued by the Finance and Administration Cabinet and the equipment acquired and distributed by KDE. For equipment that will be acquired by the districts with local funds matched by Offers of Assistance and where KDE has developed detailed specifications, Invitations for Bid (IFBs) will also be issued by the Finance and Administration Cabinet. This process will maximize the Commonwealth's buying power and provide flexibility in vendor selection. IFBs will be structured for the school and classroom level components to permit multiple contract awards. This arrangement will allow the districts to choose, based on previous local experience, from a selected list of vendors who meet all technical, local installation, training, and warranty support requirements.

For KETS hardware, software, and service components where detailed specifications cannot be developed, and where vendor responses must be subjectively evaluated, Requests for Proposal will be issued.

As in most areas of the Master Plan for Education Technology, the pilot site strategy will be used to not only evaluate the hardware and software acquired for the pilot site and model sites, but to also evaluate the procurement process prior to implementing the process and technology in the districts and schools.

3.4.10.2 Distribution

The distribution of hardware and software components that will be purchased for KETS will be a major logistics and implementation challenge. Distributing the appropriate software versions to the KDE, the regions, each of the 176 school districts, and the 1366 schools will require a management system that provides software version and network hardware configuration control for all parties using KETS.

The effective distribution of resources is critical to a successful KETS implementation and integration. It is important that the appropriate resources are distributed in a controlled fashion to the intended locations on a schedule that maximizes the utilization of the KETS in the shortest possible time frame. In addition, acceptance testing procedures have been established which the selected vendor must follow to ensure successful implementation and to receive payment.

The procurement process and the hardware and software procured for the pilot site and model sites will be installed and tested first, before large-scale procurement of technology for the districts and schools. For all levels, the vendors will ship the hardware components directly to the installation locations. Additionally, the vendors will be responsible for:

- Unpacking and verifying the components against shipping invoices and purchase orders

- Verifying and recording all component serial numbers for input into the Fixed Asset Management System
- Installation of hardware and software components
- Component acceptance testing (limited to file server systems installed at levels 3 -5)
- Connectivity to other KETS system and network components
- Testing
- Turnover to the district technology coordinators for system readiness tests
- Initial warranty service
- Ensuring acceptance sign-off by an authorized district staff member

The initial distribution and installation of operating system, commercial off-the-shelf, and application software at the state level will be done by the vendors. After initial installation, all administrative software applications will be maintained from software libraries at the state level. At the regional, district, school, and classroom levels, instructional and instructional support software will be downloaded form the state facility via the ECN, where the ECN is operational. This arrangement will eliminate the time, cost, and potential errors involved with attempting to physically install software or software updates at multiple locations within each of the 176 school districts, 1,366, schools, and 34,100 classrooms.

3.4.10.3 Maintenance

To maximize the return from the KETS investment, KDE will carefully analyze the changing maintenance requirements as KETS is phased in. A different strategy of maintenance service will be required at each of the levels of KETS.

At most levels, hardware warranty coverage will be provided by the vendors from which the components were acquired. The specifics of the warranty terms (level of coverage, length of coverage) will be determined as a part of the IFB process. Terms and conditions along with multiple-year pricing for maintenance service will also be determined through the IFB process.

At the school and classroom level, Commonwealth-certified post-warranty maintenance options will be developed by the regional centers and offered to the districts. The options offered will be:

- Vendor-provided maintenance
- Third-party provided maintenance
- District-provided (internal) maintenance
- Regional service cooperative maintenance

This arrangement will allow districts the freedom to choose a maintenance plan based on the local capabilities of, and costs associated with, the vendors, third party service companies, district maintenance staff, and the regional service cooperatives.

For mini-computer/mainframe computer operating system software and for customized applications, KDE will determine the most cost-effective source for maintenance (a determination based on capabilities, cost, and responsiveness). KDE will also maintain user-developed software that will be offered on a Commonwealth-wide basis to all levels, where applicable. KDE will be responsible for the evaluation, testing, and distribution of KETS-associated software; distribution of new releases from the state level to the regional, district, school, and classroom level will be accomplished via the ECN.

3.4.10.4 Upgrades

A key area to be addressed during the procurement process is upgrades. At issue, especially in the area of workstations, are:

- The need to upgrade existing workstations, file servers, and software that already exist in the schools, districts, and KDE.
- The need to take advantage of new technology as it emerges through the life of any procurement contract signed by the Commonwealth.

Both of these areas will be addressed during the procurement process. For the purpose of upgrading existing technology, a combined policy of system upgrade or replacement will be negotiated with each supplier To ensure that the Commonwealth will be able to acquire new technology as it becomes available, a "technology refreshment" or technology upgrade clause will also be included in contracts signed with suppliers.

3.5 Policy and Regulations

KETS implementation at all levels must be guided by formal policy statements and regulations. The Council for Education Technology (CET) will recommend policy and regulation guidelines to the State Board for Elementary and Secondary Education on an ongoing basis across the implementation of the Master Plan for Education Technology. Policy issues are critical to the success of KETS. Protection of restricted data and proper use of public networks are strictly specified in both Federal and Commonwealth statutes.

In order to effectively implement KETS at the local and state level, the State Board of Education will need to adopt policies, regulations, and guidelines as a means of ensuring efficient and effective implementation. As part of the planning and implementation process, CET will work collaboratively with educators and policy makers at all levels to develop policies, regulations, and guidelines in the following areas:

- Appropriateness of LEA long-term debt to fund education technology acquisition
- Software licensing and copyright
- On-loan and borrowed use of KETS technology
- KETS participation by local schools
- Technology staff certification program
- Protection of privacy
- Commonwealth-wide fiber optic backbone

- Use of other state funds by LEAs to serve as KETS matching funds
- Restriction of Offers of Assistance to purchases, under state procurement agreements
- Refinements to Offer of Assistance formula to adjust for districts where some schools within a given district meet KETS standard
- Right-to-know laws and guidelines that define how access to the information on KETS will be governed
- State regulations that ensure the operations and management of KETS are in compliance with Federal regulations
- Compliance with all federal education program regulations that are impacted by KETS, for example, Chapter 1
- Appropriate restrictions and penalties to ensure lack of compliance with KDE regulations governing KETS have defined sanctions
- Non-public educational organizations inclusion in large-scale procurements
- Non-public educational organizations interconnection with the KETS Commonwealth-wide telecommunications network

The Commonwealth developed policies will serve as a model for the LEAs to use in developing local KETS policies. Policy bulletins will be issued by KDE on an ongoing basis as KETS moves through the stages of implementation and develops new or expanded services.

3.6 KETS Technology Standards

In order to ensure consistency, equity, and compliance while minimizing cost, several KETS standards have been adopted. Standards have been developed for hardware and software applications. Specific details about the KETS standards are presented in Appendix A and Appendix B.

Chapter 4 Organization and Management

KETS implementation will be a significant effort requiring the skills and experience of the following participants. In order to provide maximum use of existing resources, the roles of major participants are as follows:

- KDE - Overall project management and program administration
- Digital Equipment Corporation - On-going project management and technical assistance
- Department of Information Systems - Implementation support
- Universities - Regional services for training and technical assistance
- KET - Public awareness and professional development
- Communications Advisory Council - Planning for statewide communications backbone
- Parent Teachers Associations - Local implementation support
- Foundations - Fund-raising to assist local schools in obtaining matching funds
- Finance and Administration Cabinet - Offers of assistance and procurement
- Council for Education Technology - KETS oversight and leadership

4.1 Management Plan

KDE has employed Digital Equipment Corporation as the consultant/contractor for managing and implementing KETS. The implementation will require the assignment of staff resources to all educational levels, functional application initiatives, and the development and implementation of the overall network foundation. Implementation teams will specialize in network and systems software, application software, educational integration, training/technical assistance, and procurement. Development and successful implementation of KETS will require a management structure and staffing level to provide the necessary training, technical assistance, application software development, integration services, network and systems software support and overall project administration of resources.

4.2 Organizational Structure of KETS

The following organizational structure, displayed in Figure 4-1, will provide complete and comprehensive governance and management support services to the KETS implementation project during all phases.

Figure 4-1: KETS Governance and Project Management

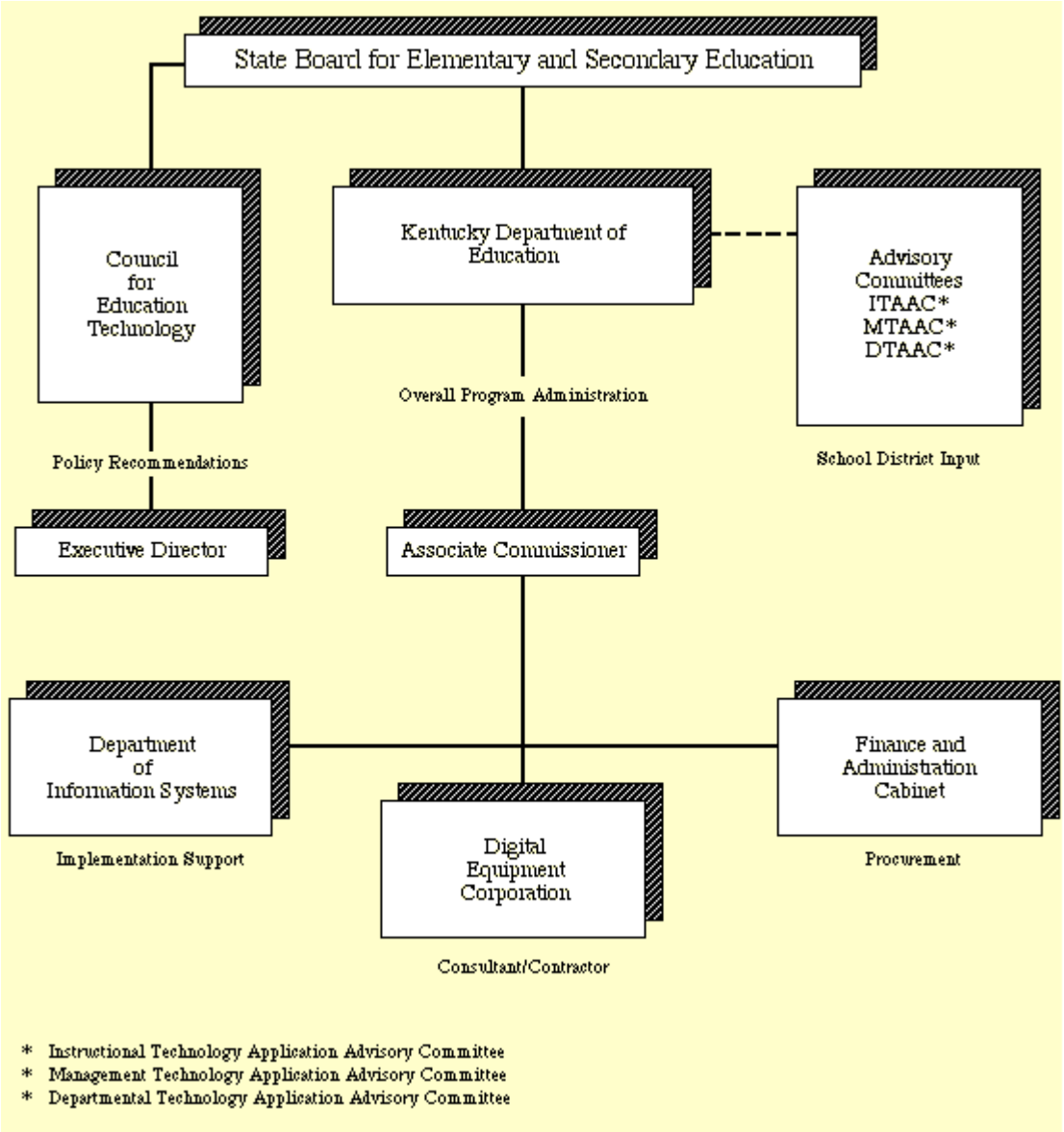
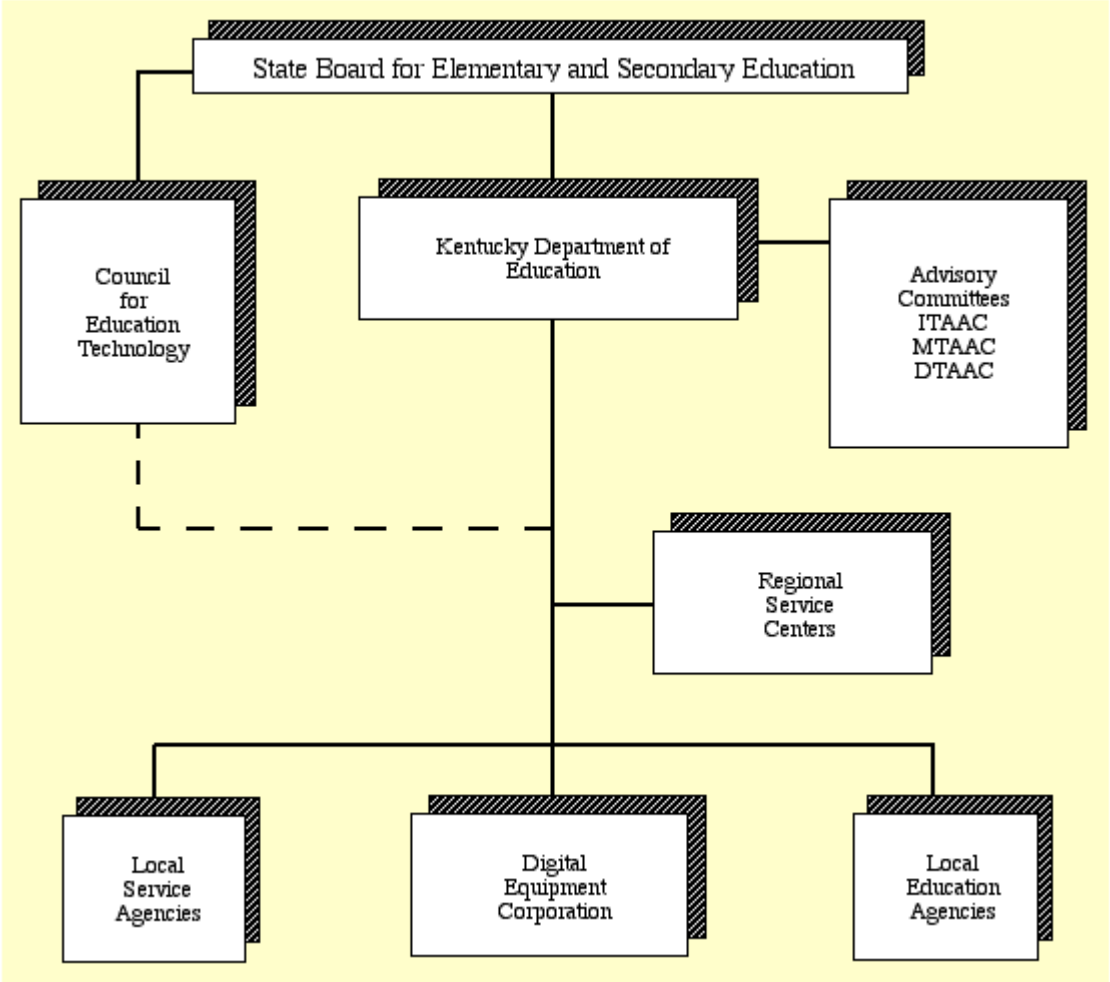


Figure 4-2 provides the KETS ongoing project organization.

Figure 4-2: Ongoing Project Organization and Operations



4.3 Roles and Responsibilities of KETS Consultant/Contractor (Digital Equipment Corporation)

Digital Equipment Corporation's role will be to serve as project manager, to provide technical assistance for KETS during Phases II-V, and to coordinate and assist with all aspects of the KETS planning and implementation process.

Digital's responsibilities will include:

- Project management support and technical assistance
- Establishment of the Education Communications Network and Education Information System
- Provide district technology planning assistance to ensure integration of existing inventory
- Development and implementation of administrative and instructional systems

- Development and coordination of all training/professional development programs
- Assisting KDE in developing a public information program
- Designing, implementing, and monitoring one state pilot and 8 model sites
- Assist KDE in seeking external funding

4.4 Roles and Responsibilities of Collaborative Agencies/Organizations

4.4.1 Higher Education

- Professional development and training assistance
- District technology planning assistance
- Evaluation and research into KETS' impact and approaches to learning
- Education communications network hub
- Integration of KETS competencies into teacher education

4.4.2 Kentucky Educational Television

- Production and delivery of professional development and training
- Dissemination of public information
- Support for distance learning objectives

4.4.3 Local Service Agencies (LSAs)

- Provide planning assistance to LEAs
- Provide technical assistance to LEAs
- Provide professional development to LEAs
- Provide technical support services to LEAs
- Provide maintenance services to LEAs

4.4.4 Local Education Agencies (LEAs)

- Develop district and school technology plan
- Implement plans upon state approval
- Integrate KETS into the delivery of education
- Provide local matching funds and accept offers of assistance

4.4.5 KDE Regional Service Centers

- Coordinate services to LEAs
- Review quality of LSA service
- Manage regional network services
- Coordinate local implementation efforts
- Review and coordinate approval of LEA technology plans

4.4.6 Department of Information Systems

- Implementation assistance
- Technical assistance
- Sharing of information systems resources (where appropriate)

4.4.7 Finance and Administration Cabinet

- Procurement
- Issuance of Offers of Assistance (School Facilities Construction Commission)

4.4.8 Workforce Development Cabinet

- Vocational education training

4.4.9 Federal Agencies

- Supplemental funds

4.4.10 Private Sector

- Supplemental funds
- Technical assistance
- Public information programs

4.4.11 Kentucky Legislature

- Legislative oversight
- Biennial funding at the end of each phase

4.4.12 Council for Education Technology

- Leadership on the goals and objectives of KETS
- Review and recommendations on the Master Plan for Education Technology
- Monitoring KETS implementation
- Identify, formulate, recommend policies necessary for implementation to SBESE

4.4.13 Kentucky Department of Education

- Staff the Council for Education Technology
- Day-to-day management of KETS implementation and operation
- Program administration

4.4.14 Legislative Research Commission

- Review and approval of the Master Plan for Education Technology
- Support in the Legislature for KETS

4.4.15 State Board for Elementary and Secondary Education

- Review and adoption of the Master Plan for Education Technology
- Receive policy recommendations from the Council for Education Technology and promulgate appropriate regulations

4.4.16 Education Technology Subcommittee of the Legislature

- Review and approval of the Master Plan for Education Technology
- Support in the Legislature for KETS

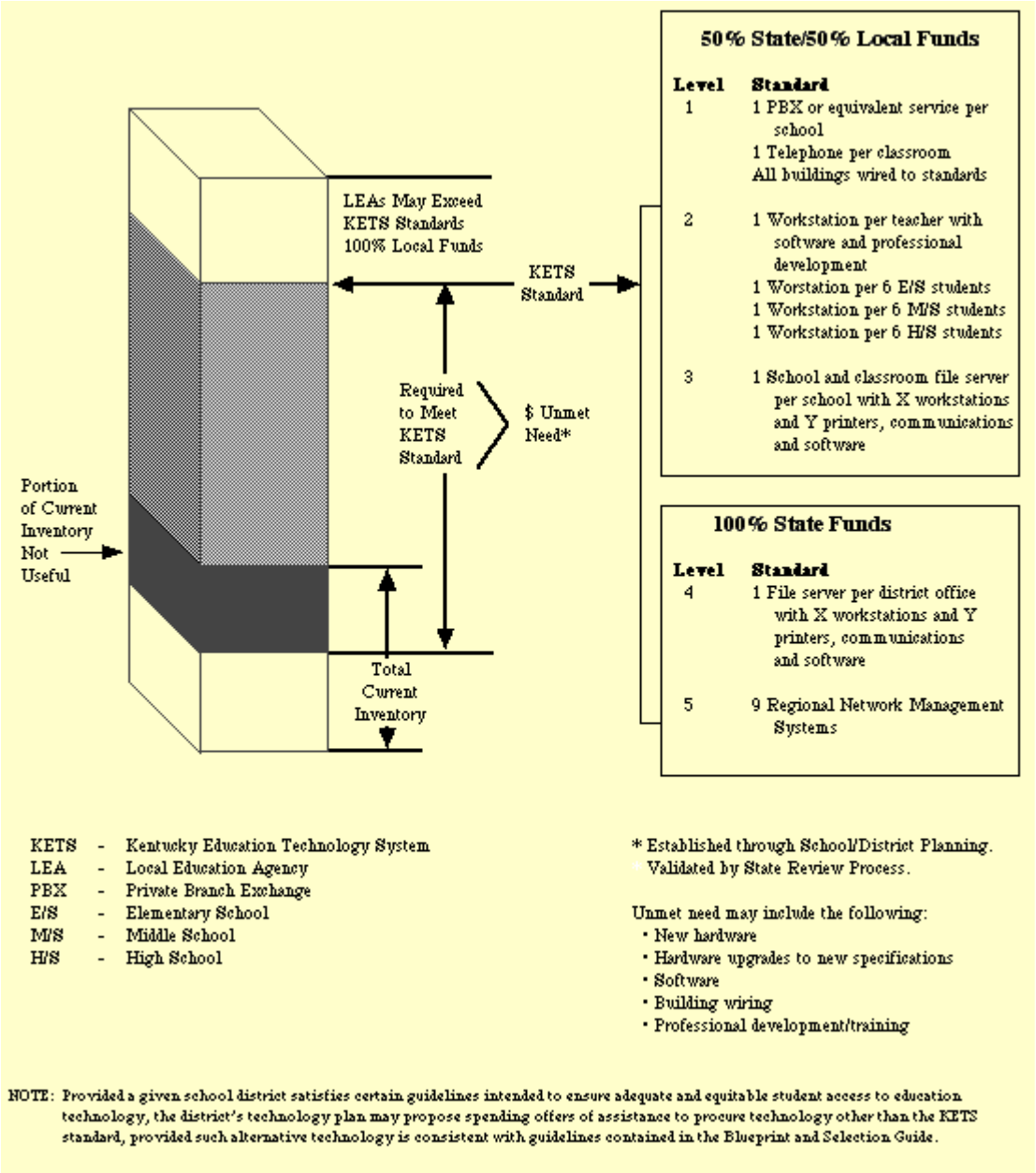
Chapter 5 Funding and Budget Parameters

The purpose of this chapter is to describe the KETS funding process and procedures, and to provide a financial overview with cost details and summaries for the acquisition and ongoing maintenance and support of KETS. The offers of assistance concept is presented using flow diagrams depicting the primary processes, the information flows into and out of each process, and the entities involved in the funding process. The flow diagrams include a narrative describing the activities within each process as well as the associated funding procedures and guidelines. This chapter also includes a series of cost analyses using graphs and worksheets.

5.1 Unmet Need

Figure 5-1 represents the KETS standard used as the baseline for determining an LEA's unmet need. An unmet need is defined as the difference between an LEA's current technology capability and the capabilities outlined as the KETS standard for each level. LEAs are required to determine their unmet need as part of the technology planning process. Unmet needs are audited as a step in the State review and assistance calculation process.

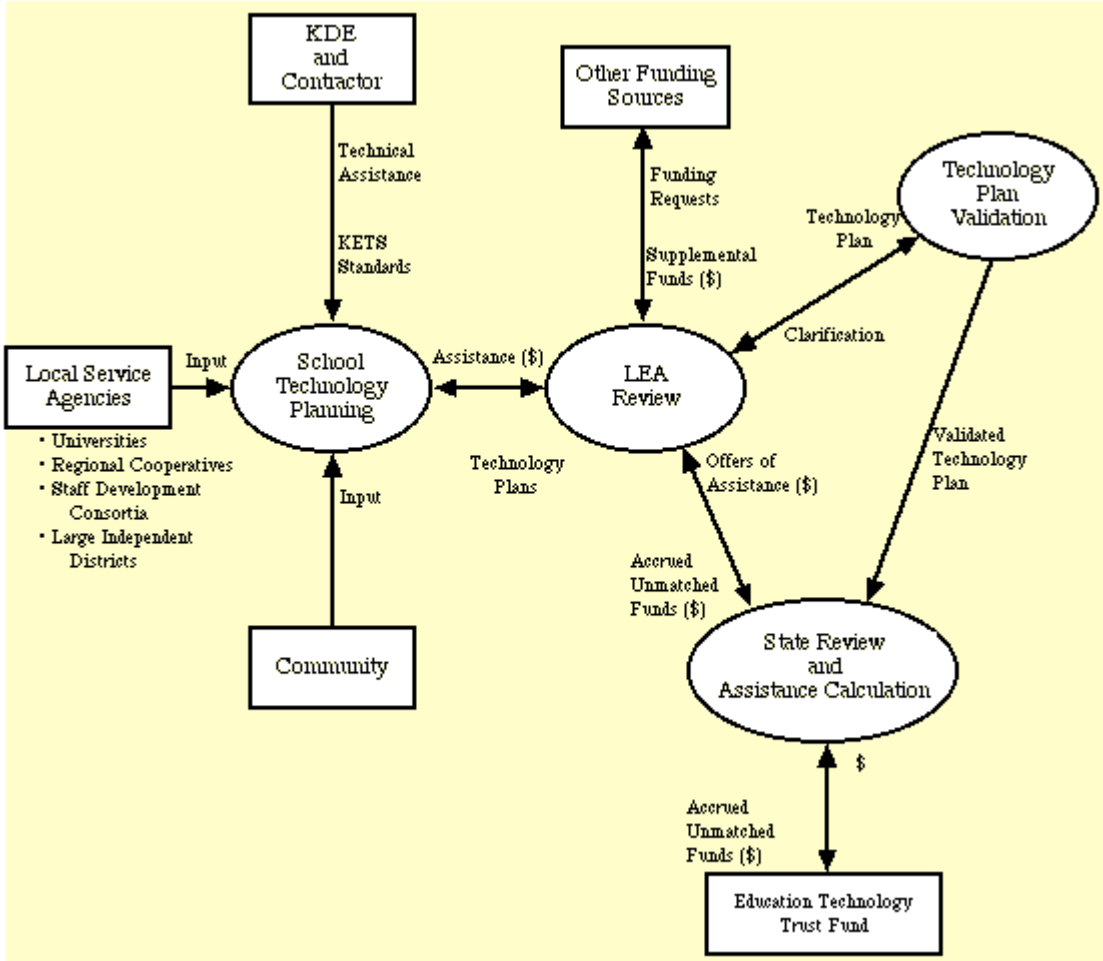
Figure 5-1: Unmet Need



5.2 Offers of Assistance

The following is an overview of the procedures and processes through which the specific amount of state assistance will be determined and awarded. The overview is presented in the following process flow diagram (Figure 5-2) and process descriptions.

Figure 5-2: Process Flow



The major processes associated with offers of assistance are represented by process circles. The primary processes are the school technology planning, LEA review, technology plan validation, and state review and assistance calculation. The arrows and their direction, depict information flows into and out of each process. The squares represent outside entities involved in the processes and the information they require or produce during the processes.

5.2.1 School Technology Planning Process

Technical assistance will be provided by the KDE for the development of planning materials and training required for writing technology plans. Prior to the second year offers of assistance, the LEA, working in cooperation with the State's Contractor/Consultant, will complete and submit a district technology plan to the Council on Education Technology for approval. The district's plan must be approved prior to receiving any funds in the second year. Schools will be responsible for authoring their respective technology plans using the technology planning guidebook, template, and training received from KDE. In the first year (1992-93), offers of assistance can be made without a district technology plan, providing this is recommended by the Council for

Education Technology and approved by the State Board for Elementary and Secondary Education. Schools will formulate their unmet needs by evaluating their current technology resources and capabilities against the KETS standard and receiving planning input from school personnel, students, and the community.

5.2.2 LEA Review

School technology plans will be submitted to the LEA, where they will be administered, consolidated, and submitted to the State for review and assistance calculation. The technology plan must include the prior year's ADA before submission to the State for review.

5.2.3 Technology Plan Validation

Technology plans will be reviewed by LSAs before submission to the State for validation. The validation process will assess the educational value (instructional and administrative) of how the plan addresses the use of technology for instructional management for delivery of instruction, and for student/school management. Questions or issues of clarification resulting from the validation process will be submitted to the LEA. Technology plans that have been validated will be submitted to the State for validation and assistance calculation.

5.2.4 State Review and Assistance Calculation

The State determines the total amount of statewide funding that will be available from the Education Technology Trust Fund within the year. District technology plans are reviewed by the State to determine the unmet need for each district. The district's unmet need is determined by analyzing the district technology plan against the established KETS standards. New funding is applied to meet the deferred offers of assistance as a first priority. The remaining funding is divided by the prior year average daily attendance (ADA) for all districts that have a current year unmet need to determine the per pupil amount of state assistance. The assistance per pupil figure is multiplied by the district's prior year ADA to determine the maximum amount of assistance available to the district within the year. An offer of assistance is then made to the LEA.

5.2.5 Matching Funds and Expenditure Requirements

In order to be eligible for offers of assistance, the LEA must match the state offer, dollar for dollar. LEAs can obtain matching funds through local resources or through acquisition of funds from those supplemental funding sources presented in Section 5.3. If the LEA cannot match the amount of assistance offered, the State will accept a smaller amount. LEAs may escrow offers of assistance for a maximum of three years or until the school/district reaches the KETS standard. Funding for rejected offers will immediately be offered to other participating districts. Once the offers of assistance are matched, the LEA is responsible for the distribution of funds based on the approved technology plan. The LEA, in conjunction with the State, tracks the assistance funds that are unmatched over the three-year accrual. Unmatched funds are released to the Education Technology Trust Fund for reallocation. LEAs may count the following toward matching offers of assistance:

- Debt service (lease purchase, bonding) due subsequent to the date of HB 698 effective April 2, 1992, provided such debt was incurred before HB 698, and for the purpose of education technology that meets or is upgraded to meet the KETS standard outlined in the Master Plan for Education Technology.
- Debt service incurred subsequent to the adoption of the Master Plan, provided such debt service is for education technology that meets the KETS standard and is identified in the LEA's approved technology plan.
- Expenses incurred in upgrading existing education technology resources to meet KETS standards, provided the upgrades were approved by KDE and identified in the LEA's technology plan.
- Current year expenditures on technology resources and technical assistance services provided that the expenditures are consistent with the Master Plan use statewide procurement/licensing agreements where possible, and are reflected in the LEA's approved technology plan.

LEAs and schools can match offers of assistance through supplemental funding sources described in Section 5.3.

Offers of assistance and associated matching funds must be spent on only that education technology that meets the KETS standards established in the Master Plan and is identified in the LEA's State-approved technology plan. Offers of assistance shall not apply to any purchases or contracts made between the effective date of HB 698 (April 2, 1992) and the first offers of assistance recommended for approval by the Council for Education Technology.

Figure 5-3 provides an example of an offer of assistance process and procedure for a typical school district. The district has established its unmet need to be $900,000 validated by the KDE through the technology review and assistance calculation process. The KETS standard was used in determining and validating the LEA's unmet need. The per pupil level of assistance was calculated at $32 by dividing the Statewide assistance available ($18.1 million) in each of the three years by the Statewide prior year ADA (570,000) for each of the three years. The LEA's eligibility for state assistance ($200,000) was calculated by multiplying the LEA's prior year ADA (6,250) by the calculated per pupil level of assistance ($32).

Figure 5-3 graphically reiterates the calculation of state assistance and shows that LEAs must match an amount equal to or less than the State's offer. Offers of Assistance funds not matched by the LEA in that year can be carried forward and accrued to the succeeding year to determine an LEA's progress toward their unmet need. Unmatched funds can be carried forward for a total of 3 years or when a school/district meets the KETS standard. The figure also shows that LEAs using their own funding are capable of buying technology prior to KETS and after reaching the KETS standard.

Figure 5-3: Offers of Assistance

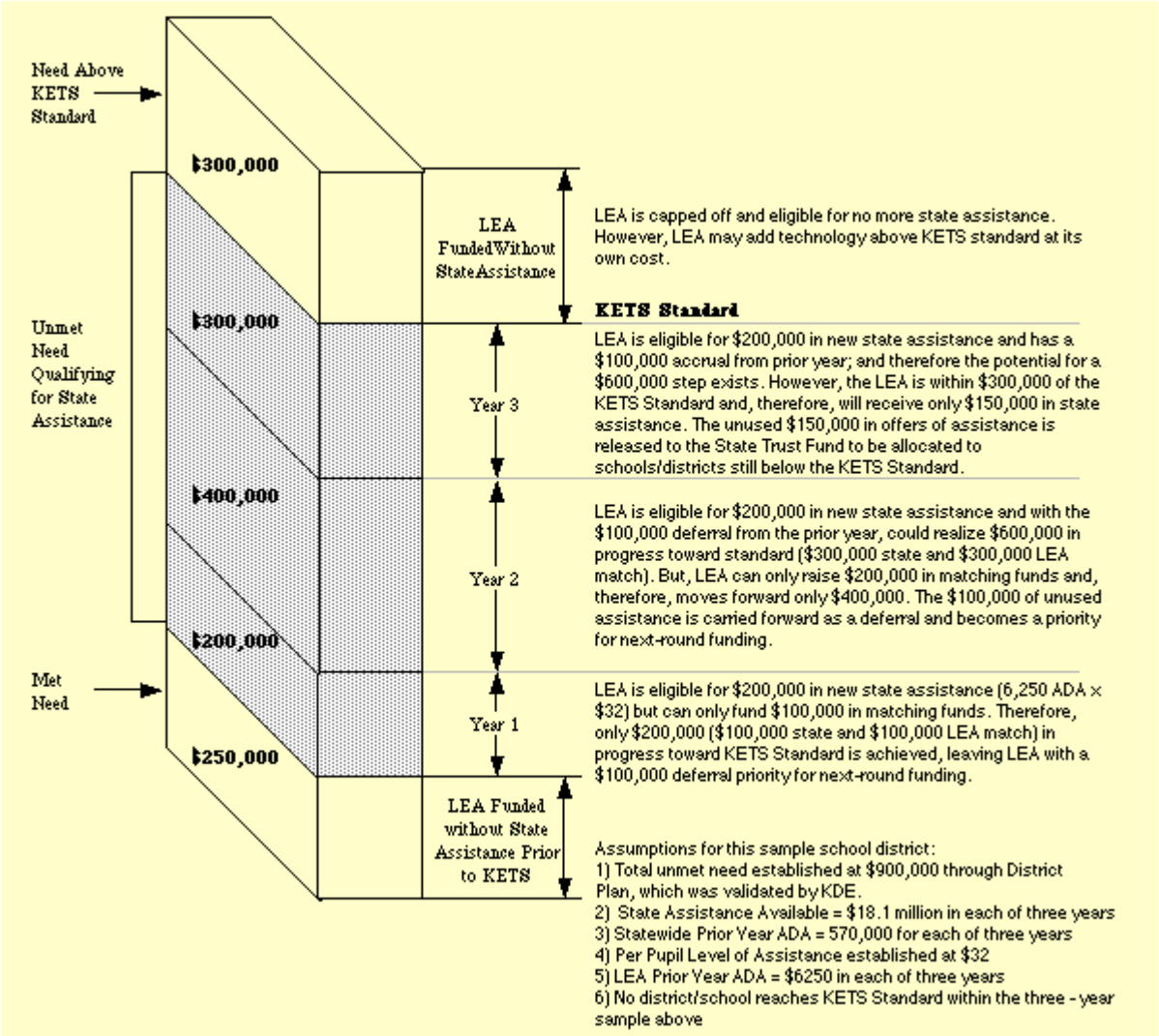


Figure 5-4 complements Figure 5-3 by providing an accounting of funding for unmet need.

Figure 5-4: Unmet Need Accounting

Unmet Need Accounting	**Year 1**		**Year 2**		**Year 3**	
LEA Unmet Need		**$900,000**				
Unmet Need Beginning Balance				**$700,000**		**$300,000**
Offer of Assistance	$200,000		$200,000		$200,000	
Deferred Offer of Assistance	$0		$100,000		$100,000	
Total State Assistance Available	$200,000		$300,000		$300,000	
LEA Matching	$200,000		$300,000		$300,000	
Yearly Funding Potential	$400,000		$600,000		$600,000	
LEA Matching Capability or KETS Limit	$100,000		$200,000		$150,000	
State Assistance based on LEA Matching	$100,000		$200,000		$150,000	

Total Yearly Progress	**$200,000**	**$400,000**	**$300,000**
Unmet Need Balance	**$700,000**	**$300,000**	**$0**

Using the funding assumptions, the LEA's eligibility for state assistance for each year is $200,000, calculated by multiplying the LEA's prior year ADA (6,250) by the per pupil level of assistance ($32). In year 1, the LEA's potential funding toward its unmet need is $400,000 ($200,000 in state assistance plus $200,000 LEA matching). Since the LEA is only able to match $100,000 of the state's $200,000 offer, a deferral of $100,000 is carried forward to year 2, leaving the LEA with a total of $200,000 for year 1 funding ($100,000 state funding plus $100,000 LEA match). The LEA's unmet need balance becomes $700,000 ($900,000 established through the district plan less $200,000 year 1 funding).

In year 2, the LEA is eligible for $200,000 in state assistance but may also include the carryover deferral ($100,000) from the previous year. The district could realize a total of $600,000 ($300,000 state assistance and $300,000 LEA match) toward their unmet need balance of $700,000. Because the LEA can only match $200,000 of the State's potential offer of $300,000, the LEA funding for year 2 will be $400,000 ($200,000 state and $200,000 LEA match), resulting in deferral of $100,000 to be carried forward to year 3. The LEA's unmet balance at the end of year 2 becomes $300,000 ($900,000 total unmet need less $600,000 year 1 and 2 funding).

In year 3, the total state assistance available to the LEA is $300,000 ($200,000 offer plus $100,000 year 2 carryover) however; a matching of this amount by the LEA would exceed its remaining unmet need of $300,000. Therefore, the state's offer must be $150,000 with an LEA match of $150,000 to satisfy the LEA's unmet need balance of $300,000. The unmatched offer of $150,000 ($300,000 state offer less $150,000 LEA match) is released to the State Trust Fund for reallocation to those schools/districts that remain below the KETS standard.

5.3 Supplemental Funding Sources

KETS offers the opportunity for schools to supplement funding from other sources. The following are potential supplemental funding sources:

- Chapter 2 Funds (20% of LEA allocation)
- Special Education Funds (20% of LEA allocation)
- Perkins/Vocational education (20% of LEA allocation)
- Technical Assistance

In addition to the above potential supplemental funding sources, the KDE and the CET will investigate the use of other sources of professional development funding, including:

- Other Federal education programs (Chapter 1, Eisenhower Program)
- Foundation grants
- Federal grants
- Private donations

Appendix A

KETS Technology Standards

Council for Education Technology Subcommittee on Technology Standards and Technology Vendors' Advisory Council

Members of the vendor community have much expertise and experience that can be of value to the Council for Education Technology as the implementation of KETS progresses. In an effort to facilitate the exchange of information between them, two new bodies will be formed, as described below. Their purpose is to ensure that information contained in the Blueprint/Selection Guide regarding the initial selection of technology (software, hardware, wiring, etc.) and the upgrading of technology is accurate, appropriate, fully compatible with the design of KETS, and meets the instructional and administrative requirements of students and educators.

Council for Education Technology Subcommittee on Technology Standards

The Council for Education Technology will form a Subcommittee on Technology Standards consisting of three members of the Council for Education Technology, including the Council's vice-chairperson who will chair this subcommittee. Staff assistance will be provided by the Kentucky Department of Education and the Consultant/Contractor. The subcommittee will report to the full council as necessary.

Technology Vendors' Advisory Council

Members of this Council shall include representatives from providers of hardware, networking, wiring, software, telephones/phone service, monitors, assistive technologies, multimedia products, and services, such as repair, maintenance, operations, professional development, and technical assistance. Membership may fluctuate according to the needs of the Subcommittee on Technology Standards. The Council shall provide information, expertise, and advice to the Council for Education Technology Subcommittee on Technology Standards and will serve in an advisory capacity only. The vendors will determine the best means for organizing, managing, and communicating among their members.

Hardware Platforms

There are many ways of providing computing capacity and system services to support the Education Information Systems (EIS) applications. As a result, great flexibility should be given as to how the requirements are met. For example, vendors may propose separate mid-range and file server systems, a single mid-range system capable of both, or a file server, which alone provides all EIS functions. Separate gateways may be used to meet certain functionality, such as interfacing to the existing SNA network, or these functions can be incorporated into the microcomputer or file server.

The following discussions and sizing estimates assume that separate mid-range systems and file servers will be employed. However, this is not intended to limit solutions to this dual platform architecture only.

Computer Sizing

The capacity of the EIS system at the district will depend on the size of the school district it will serve. There is no generally accepted standard benchmark for measuring computer capacity for educational applications. Three approaches are possible:

1. Develop a special benchmark that measures the kind of educational activity envisioned which will be run by all EIS bidders.
2. Find a standard benchmark that approximates this load.
3. Perfect whichever sizing technique that is employed at the pilot and model sites.

Developing a benchmark in a networked environment is a long and costly approach. Instead, TPC Benchmark A developed by the Transaction Processing Performance Council (TPC) will be used to measure the capacity of EIS systems. The TPC Benchmark A is designed to be a vendor-neutral standard specification for measuring the number of transactions a system is capable of executing in a given period of time. The benchmarks produce a rating of transactions per second (tps). The benchmark requires that 90% of all transactions complete in less than two seconds. The TPC Benchmark A is designed to represent an on-line banking application with many simultaneous users and, as such, measures the total interaction of network, processor, and disk subsystems. TPC better represents education applications than other commonly used benchmarks, such as SPECmarks, LINPACK, and various batch benchmarks that measure primarily processor capacity and that do not address the networking performance.

The size of the EIS system depends upon the size of the school district served and the types of software run on it. Figure A-1 combines application software into Instruction, Instructional Support, Communications and Information Services, Office Services, Student/School Management and Administration. The Central Processing Unit (CPU), memory, and disk for each software component to be run on the system should be added together to determine the size of the system required. Figure A-1 shows the interrelationship of these application software groupings and the size of the district served.

Figure A-1: EIS Application Server Sizing

Student Population of School Districts Served

	1,000	3,000	6,000	12,000	24,000	48,000	96,000
1. Communications and Information Services							
CPU (tps)	1.5	3.0	4.0	5.5	11	16	24
Memory (MB)	4	6	10	15	20	28	40
Disk (GB)	.15	.25	.4	.7	1.4	2.8	5.6
2. Office Services							
CPU (tps)	2.5	5	7	9.5	13	17	26
Memory (MB)	5	10	18	33	48	66	86
Disk (GB)	.20	.45	.60	1.2	2.4	4.8	9.6
3. Student/School Management and Administration							
CPU (tps)	7	10	13.5	128	24	34	60
Memory (MB)	6	13	24	48	74	108	142
Disk (GB)	.45	.80	1.0	2.1	4.2	8.4	16.8
4. Instructional Support							
CPU (tps)	4	6	7.5	11	14	18	30
Memory (MB)	5	7	12	16	20	26	38
Disk (GB)	.2	.4	.7	1.2	2.0	3.4	6.0
5. Instructional (Micro-based DOS/MAC/Apple II, etc.)							
CPU (tps)	*** CPU sizing for function 1-4 above are included above.						
Memory (MB)	*** Memory sizing for functions 1-4 above are included above.						
Disk (GB)	.2	.3	.4	.5	.6	.8	1.2

Legend:

tps	=	Transactions per second based on the TPC/A Benchmark
MB	=	Megabyte (1,000,000 bytes per second)
GB	=	Gigabyte (1,000,000,000 bytes per second)
Kbps	=	Kilobytes per second (1,000 bytes per second)
SC	=	Small Cartridge Tape Drive (approximately 100 Mb)
LC	=	Large Cartridge Tape Drive (approximately 2.0 Gb)
9t	=	1600 bpi 9-track tape
9t+	=	1600/6250 bpi 9-track tape
MC	=	Multi-Cartridge Tape Drive for multiple disk backup
ports	=	Terminal ports for either local or dial-in terminal access
S	=	Small (small printer with low page per month and speed)
L	=	Large (floor model printer with high output and 600 lines per minute. (Larger printer estimates can be combined for selection of 'very large' quality/speed devices)

*** CPU and memory considerations for micro-based functions are addressed in the Blueprint/Selection Guide. The disk capacity noted above is for backup and disaster recovery at the student/teacher level.

Figure A-2 summarizes the recommended capacities for EIS systems for different size school districts assuming that all EIS software will run on the system.

Figure A-2: Hardware Performance Requirements

Student Population of School District

Hardware	<1,000	<3,000	<6,000	<12,000	<24,000	<48,000	<96,000
CPU	15	24	32	44	64	85	140
Memory (MB)	20	36	64	112	162	228	306
Disk Drives (GB)	1.2	2.2	3.1	5.7	10.6	20.2	39.2
Tape Drives	SC	SC	9t/LC	Pt+/LC	9t+/MC	9t+/MC	9+/MC
CD-ROM	1	1	1	1	2	2	2
Serial Ports	8	8	8	16	24	48	80
Printers	2-S	5-S	1-L/5-S	3-L/4-S	5-L/9-S	9-L/16-S	16-L/30S
Laser Printers	2-S	1-L/2-S	2-L/3-S	4-L/5-S	8-L/9-S	16-L/17-S	30-L/32-S
Dot Matrix	5-S	9-S	17-S	31-S	56-S	100-S	198-S
Modems (9.6 Kps)	4	4	4	8	12	24	40

Legend:

tps	=	Transactions per second based on the TPC/A Benchmark
MB	=	Megabyte (1,000,000 bytes per second)
GB	=	Gigabyte (1,000,000,000 bytes per second)
Kbps	=	Kilobytes per second (1,000 bytes per second)
SC	=	Small Cartridge Tape Drive (approximately 100 Mb)
LC	=	Large Cartridge Tape Drive (approximately 2.0 Gb)
9t	=	1600 bpi 9-track tape

9t+	=	1600/6250 bpi 9-track tape
MC	=	Multi-Cartridge Tape Drive for multiple disk backup
ports	=	Terminal ports for either local or dial-in terminal access
S	=	Small (small printer with low page per month and speed)
		Large (floor model printer with high output and 600 lines per minute. (Larger printer estimates can be combined for selection of 'very large' quality/speed devices)

Appendix B

KETS Software Applications

This appendix summarizes KETS software.

Table B-1: Software Applications

Instructional and Administrative Functions

News and Bulletin Board Services

Usage Guidelines and Tutorials
Local News
Remote News
Job Alike Bulletin Boards
Professional Organizations
Job Openings/Positions Available
Flash Bulletins

Professional Development and Training Services

Usage Guidelines and Tutorials
Individual Development Plan Maintenance
Catalog of Services Available

- Local Services (through the network)
- Local Services (stand-alone mode)
- Remote Services

Catalog Maintenance
Professional Organizations
Statewide Professional Development/Training Schedule

Classroom Applications (Instructional)

Help Screen and "How-to..." Programs
Tool Applications:

- Word Processor
- Database
- Spreadsheet

- Graphics
- Telecommunications
- Desktop Publishing
- Desktop Presentation

Information Database

Local:

- Local Bulletin Boards

Remote:

- Non-Commercial Services (Eastern Kentucky Teachers Network, InterNet, BitNet, KET-Net, NSF's NREN, Kentucky Library Network, etc.)

Instructional Software

Software leads to the achievement of the six goals
Software addresses the 75 Valued Outcomes
Software meets standards to be set by ITAAC and KDE (interdisciplinary, cooperative learning, real world applications, higher order skills, service to community, etc.)
Instructional Support
Usage Guidelines and Tutorials
Instructional Management Services
Performance Assessment Services
Objective Assessment Services
Individual Education Programs (IEPs)
Student Portfolio Maintenance
Instructional Materials Scheduling
Instructional Program Scheduling (KET)

Learning Support (Family/School connection)

Using a phone, provides access to:

- Direct communication between parents and teachers via voice mail (a system of leaving personalized messages)
- Teacher schedules to make scheduling of conferences easier
- School calendar of events

- Homework hotline for students
- Listing of videotaped classes, demonstrations, and guest speakers for use by homebound students
- Teachers, students, and classes by homebound students
- Homework assignments for students
- Teacher-recommended activities related to the accomplishment of valued outcomes

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Student/School Management Services

Usage Guidelines and Tutorials
Student Demographics
Scheduling/Registration
Attendance, Accounting, and Reporting
Counseling, Discipline, and Guidance
Grade Reporting
School Calendaring/Activities Scheduling
Scheduled Assessment Activities
Monitoring/Reporting School Performance
Library Management

Administrative Systems

Usage Guidelines and Tutorials
Finance
Payroll
Personnel
Inventory/Warehouse
Fixed Assets
Energy Management
Purchasing

Office Services

Usage Guidelines and Tutorials
Word Processing
Spreadsheet
List Management (Database)
Calendar Management
Desktop Publishing

Communication Services

Presentation Graphics
Notepad/To-Do Lists
Messaging
Usage Guidelines and Tutorials
Organizational Directories (Name, address, phone, FAX, etc.)
Electronic Mail Service
Logging Problems/ Maintenance Calls
FAX Services
Special Interest Group (SIG) Directories and Informal Networks

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Network Software Library Services

Usage Guidelines and Tutorials
Catalog of Software Available
Search/Retrieve
Catalog Maintenance

Electronic Document Library Services

Usage Guidelines
State Board Meeting Agendas and Minutes
Agency Reporting Requirements
Valued Outcomes
Curriculum Frameworks
Program Advisories

System and Network Management Services

Usage Guidelines and Tutorials
Reviewing User and System Messages
Diagnostic Routines
Managing Repair and Maintenance Activities
Inventorying System Assets
Modifying Network Configurations
Modifying System Variables
Maintaining System Security
Backup and Recovery Procedures
Network Traffic Monitoring and Control
Software Utilization Reporting
Hardware Utilization Studies

KETS Glossary

ADA	Average Daily Attendance
CET	Council for Education Technology
DIS	Department of Information Systems
DTAAC	Departmental Technology Applications Advisory Committee
ECN	Education Communications Network
EIS	Education Information System
FAC	Finance and Administration Cabinet
IFB	Invitation for Bid
IHE	Institutions of Higher Education
ISSP	Information System Services Provider
ITAAC	Instructional Technology Applications Advisory Committee
KDE	Kentucky Department of Education
KERA	Kentucky Education Reform Act
KET	Kentucky Education Television
KETS	Kentucky Education Technology System
LAN	Local Area Network
LRC	Legislative Research Commission
LEA	Local Education Agencies
LSA	Local Service Agencies
MTAAC	Management Technology Applications Advisory Committee
PBX	Private Branch Exchange
RFP	Request for Proposal
RSC	Regional Service Center(s)
SBESE	State Board for Elementary and Secondary Education
SNA	Systems Network Architecture

TPC	Transaction Processing Council
tps	Transactions per second
WAN	Wide Area Network

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