

KERALA AGRICULTURAL UNIVERSITY
CAMPUS WIDE INFORMATION SYSTEM
AND NETWORK
Feasibility Report

1995

Dr. Surya N.K. Bhagi & Prof. R. Raman Nair

With Technical Support of Team of Experts From
Centre for Agricultural Informatics

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ESTABLISHMENT OF KERALA AGRICULTURAL UNIVERSITY CAMPUS WIDE INFORMATION SYSTEM AND NETWORK

Executive Summary

A Feasibility Report prepared by Centre for Agricultural Informatics on establishing a Campus Network for Kerala Agricultural University's (KAU) main campus (at Vellanikkar, Thrissur) and a state-of-the art Electronic Data Complex in its University Library premises. For the dissemination of topical awareness and global information to those in agricultural sector of the State, KAU needs to build A Campus LAN and state-of-the art Agricultural Digital Library and Data Complex within its central library. This can become a show case of the electronic age in agriculture and allied disciplines and will promote, propagate and catalogue the agricultural economy that India is so dependent on. The data complex will be a cached repository of agricultural information available worldwide, besides acting as a data silo for research forums, concurrent research, electronic publishing and global bulletin boards. The scattered campuses of KAU and allied institutions also need to be linked through electronic bridges that enable spontaneous exchange of information between the agricultural Diaspora of students, faculties, researchers, extension workers and administrators. The report covers mandate of the proposed system, detailed discussion on computer and communication stack that KAU Campus Wide Information System and Network needs, the architecture prescription, network design, MultiStack and DEChub 900 options available, host environment, financial terms, implementation methodology, installation/ support continuum, network synthesis and integration, systems engineering support, commercial terms and conditions, cost, time frames and the administrative arrangements required. Open Network, with Protocol Switching and Networked Systems Management based on Digital's enVISN Networking Architecture and Enterprise Management Solutions is recommended. Detailed Technical literature and specifications of each and every item of computer and communication stack and solution recommended is appended to the report.

ESTABLISHMENT OF KERALA AGRICULTURAL UNIVERSITY: CAMPUS WIDE INFORMATION SYSTEM AND NETWORK

Feasibility Report

1. The Setting

Information is a productive resource in agriculture, potentially influencing the efficiency of production, marketing, processing and administration; as well as education, research and extension related to those factors. So the development process in agriculture rests heavily on information available to managers, scientists and farmers. Agricultural information systems have also become crucial in the context of increasing requirement for food grains as well as globalization. Cost of establishing information infrastructures may be expensive, but the costs of not doing so are likely to be much higher in terms of productivity, quality and value addition.

In Kerala clear policy framework coupled with sound planning and implementation backed by generous research and development investments and efficient information support is essential to ensure sustained production of food grains and other agricultural commodities. We need to take measures based on research to stabilize the annual agricultural production, which fluctuate due to weather, pests and plant diseases. To enable this establishing an information resource-sharing programme among the organizations in agricultural sector of Kerala has become very important. This obviously necessitates the establishment of an Agricultural Information system and Network in the State to enable the sector to evolve appropriate strategies and plans for sustainable agricultural development. The Network should cover the institutions, departments and agencies having capability in the areas of agriculture, animal husbandry, fisheries, trade, and information technology. Some institution has to take the leadership.

1.1 Centre for Agricultural Informatics (CAGI)

Centre for Agricultural Informatics (CAGI) is a research institution functioning under Government of India Act XXI of 1860. The mission of the Centre is to act as a center of excellence in agricultural informatics and to assist agricultural education, research, extension and development by evolving required information and communication strategies, to provide training and advisory services to organizations in agricultural sector for enabling them to identify appropriate policies for information management and the implementation of new knowledge and Information and Communication Technology (ICT) for improving the efficiency and relevance of agricultural research and to provide consultancy in establishing legal frameworks for the protection of agricultural information and innovations.

CAGI has a high profiled consulting group in India's agricultural sector which is a team of experts providing voluntary service to it specialized in Open Networks, Protocol Switching and Networked Systems Management based on Digital's enVISN Networking Architecture and Enterprise Management Solutions. Through a fully equipped Open Systems Laboratory at Tellycherry, CAGI architects provide advisory services and outsourced technology incubation and prototyping exercises for customers in the following functional areas.

- ? Network Models for interleaving SNA, OSI and TCP/IP protocols
- ? Synergy models for high volume transaction processing
- ? Object Models for Open Topology and Configuration Management
- ? White Papers and Blue Prints for Network Management
- ? Proof of Concepts and Prototypes for Enterprise Management
- ? Conformance testing of Enterprise Management solutions

Breadth of expertise and experience was derived by the team working with CAGI through numerous networking assignments with leading networking organizations hosting multi-vendor, multi-protocol platforms in Europe and elsewhere. The leader of the team of architects associating with CAGI is an Industry Consultant for Digital's enVISN architecture, IBM's Enterprise Management product line, an IBM SSO (Software and Services Organization) in Germany and a Consultant in India.

Additionally, CAGI has close association with Centre for Informatics Research and Development (CIRD) an organization which is a dedicated System Integrator in the Netview Association from Digital and other systems and uses CAGI as an extended

arm to assess and calibrate the technical solutions it offers to the international clientele.

1.2 Centre for Informatics Research and Development (CIRD)

CIRD was founded in 1994 by Mr. N. K. Bhagi, an internationally acknowledged specialist in the area of data communications and network management. In a career spanning 24 years, he has had ample opportunities to work with leading providers and users of networking and network management products and solutions, which has synthesized in him a unique blend of technical, commercial, marketing and project management skills in this leading edge business. CIRD, the Enterprise Management Technology Centre located at Tellycherri was formed with the express objective of bringing back to India, some of these skills that helped design, install, implement and run some of the worlds largest and most complicated data communication networks.

CIRD has grown into a group of highly dedicated and specialized professionals devoted to bringing the latest techniques and skills in networking and network management to Indian users. This has been achieved by association of professionally trained personnel from backgrounds such as Library and Information Science, Documentation, Archiving, Computer Science, Management, Economics, Mathematics and Agriculture and providing them with the opportunities for associating with international and state-of-the-art projects in networking. Due to the team member's close working relationship with Digital Electronics Corporation, CIRD personnel have the rare opportunity to receive and assimilate information on 'best of breed' networking solutions. CIRD's Laboratory and Technology Centre in Tellycherry harbors some of the latest hardware, software and communication products that can simulate and stress-test networks of different protocols, complexities and sizes.

CIRD has the expertise today, through its personnel, to provide advisory and other services in the following areas:

- ? Development of long term technology and information management/services for network based information systems.
- ? Network design and architecture
- ? Project management
- ? Forging alliances for networking solutions with Indian and overseas providers and users
- ? Conformance testing and product selection

- ? Network management solutions -from design to implementation
- ? Prototype development of technical, business and operations models for network based businesses -for example, Internet services
- ? Complete de-hosting of corporate networks and network management related activities

2. The KAU Request for Proposal

CAGI is a Networking Solutions Group operating alongside her sibling concern, CIRD from her Technology Centre at Tellycherry, Kerala.

Kerala Agricultural University (KAU) is a premier institution in India, imparting awareness and proficiency in the field of topical agriculture, from its lush, sylvan campus at Vellanikkara in Trichur District. The KAU is the primary and the principal instrument of the State of Kerala for providing human resources, skills and technology, required for the sustainable development of agriculture in the State which includes all production activities based on land and water, including crop production (agriculture), animal husbandry, forestry and fisheries through conducting, interfacing and integrating education, research and extension in these spheres of economic endeavor. Dissemination of newer knowledge in various areas of agriculture is an important mandatory function of KAU.

KAU has 9 major campuses and 42 minor campuses which includes colleges, Regional Agricultural Research Stations, Research Stations, Centers of Advance studies, Training Institutes, Communication Centers, Krishi Vigyan Kendras, and Agricultural Information Technology Centers spread over a distance of more than 600 km, North–South. It has about 850 faculty members. UG and PG students come to about 1500.

The information infrastructure under KAU is quite traditional and a need is being felt to augment the data communication and networking facilities to provide better interaction amongst the scientists within KAU using contemporary ICT based tools and facilities as also set up an external gateway to national and global networks to facilitate information exchange with peer scientists and institutions within the country and abroad including international organizations such as FAO, CIGAR, Rice Research Institute, etc.

Over the last few years the ICT and advances in the networking infrastructure all over the world have revolutionized the way research is conducted today. Scientists have access to Internet which facilitates rapid exchange of ideas and research data among scientists. Access to Information Systems, libraries and computing facilities has become very convenient over the Internet. Indian Academic and Research Community have also started availing of full benefits of Internet services through ERNET (Education Research Network) project of department of Electronics under Government of India. Presently More than 35000 scientists from over 650 organizations are using the facilities of ERNET. Scientists, researchers and students at KAU will greatly benefit in furthering academic, research pursuits as also administrative coordination within the campus and establish collaborative links with other organizations in India and abroad, if such facilities are made available to them.

With this background Dr. A.M. Michael, Vice Chancellor of KAU has in 1995 in an informal discussion expressed the interest of the university to take initiative in establishing an Agricultural Information System in the State under the leadership of the University. He has also expressed the view that being a system meant mainly for collecting managing, sharing and facilitating access to information the infrastructure required for developing and managing content and related services are to be established in the first phase.

A preliminary survey conducted by CAGI has revealed that a Campus Wide Information System and network with the KAU Central Library an ICT based system which is coming up; as the Central hub to manage content can be established in the main campus of KAU to begin with. As a follow up to this suggestion Dr. Michael, the Vice Chancellor of KAU has directed Prof. R. Raman Nair, University Librarian to prepare a Feasibility Report for the same using voluntary technical support from CAGI.

2.1. ICT Development Plan of KAU

In the request for technical advice and voluntary support placed by Prof. R. Raman Nair the following aspects of KAU's plans to establish a Campus LAN and build a premises network within the library building were revealed:

- ? KAU is interested in implementing a network fabric that will encompass its Library building and integrate into the premises network to be built in the second phase with the option to connect remotely and avail of Library services over urban dial-up telephone lines.

- ? In the not too distant future, this network is envisaged to interconnect eight colleges and more than forty research station campuses under KAU spread over the length and breadth of the State. In later phases it will interconnect campuses of other organizations under ICAR and State government in the agricultural sector of Kerala.
- ? Initially KAU is seeking a Server platform to host their legacy library management system alongside emerging application technologies and insure the smooth and non-disruptive migration of the incumbent system into a futuristic one that will keep them on the leading edge of technology.
- ? KAU is interested in seeking external assistance and consulting advice to architect, design and manage its data communication network.

CAGI has the technical and managerial expertise to actively assist KAU in meeting the objectives listed above and if essential can provide:

- ? Assistance in defining networking requirements,
- ? Network Architecture, Design and Planning for IP, OSI and SNA and for inter networking heterogeneous systems.
- ? Eligibility definition / framework for communication stacks, software hardware products and brand / vendor selection and negotiation
- ? Technology re-tooling and performance tuning counseling for preservation of post-modern status through emerging technologies within a non-disruptive service continuum
- ? Complete network management (covering areas of Fault, Configuration / Topology, Accounting, Performance and Security) using state-of-the-art network management tools.

In response to the request from KAU Library CAGI has arranged a team of experts on concerned areas to act as a technical group under Prof. R. Raman Nair to study the existing infrastructure and requirements of the KAU and agricultural sector of the State and prepare a technical report.

This resultant report presented here, propose a plan for establishing a Campus Wide Information System and Network at the KAU Main Campus with an Agricultural and Farm Information System in the high tech University Library which is to function as the central hub. In later phases KAU network will be interlinked with campus networks of other agricultural research, development and extension institutions in Kerala up to the

Krishi Bhavans to enable flow of results of research down to the grass root level to improve productivity in agriculture.

The network configurations and standards for software and hardware required for the system are also specified here after a detailed technology evaluation and market survey. The network proposed can serve as a model for other State agricultural information systems also.

3. Objectives of the Proposed System

The main objective of the KAU Information System and Network will be to support agricultural sector of the State for quality improvement in agricultural education, research, extension and development and to enable farmers to achieve higher income and prosperity through productivity improvement, quality enhancement, value addition and farmer-friendly marketing of agricultural produce. To achieve this the system will have the following objectives.

- ? Putting information close to the managers, scientists, extension activists and farmers who will use it.
- ? Improving the capacity of research organizations in agricultural sector to organize, store, and retrieve information relevant to their mandates.
- ? Developing regular procedures and mechanisms for those organizations to share information.
- ? As a result of the above to improve the capacity of those organizations to plan, monitor, and evaluate their research and development programs

3.1. Mission

In order to achieve the above goals, the system is proposed to have the following mandate:

- ? To serve as a decision support system to the University, Government, Trade and Farmers in the area of agriculture, animal husbandry, poultry, fisheries etc.
- ? To provide a user oriented and demand-driven Database Management System on agriculture, animal husbandry, fisheries and trade in agriculture to different clientele groups.
- ? To facilitate access to national and international databases, information centers and networks in dealing with agriculture.

- ? To encourage the participants to pool and share their information resources so that a usable and exhaustive knowledge resource base required in the field of agriculture is built up and the limited funds are put to optimum use.
- ? To impart training for different stakeholders in agriculture on specific areas of concern related to ICT application in agriculture.

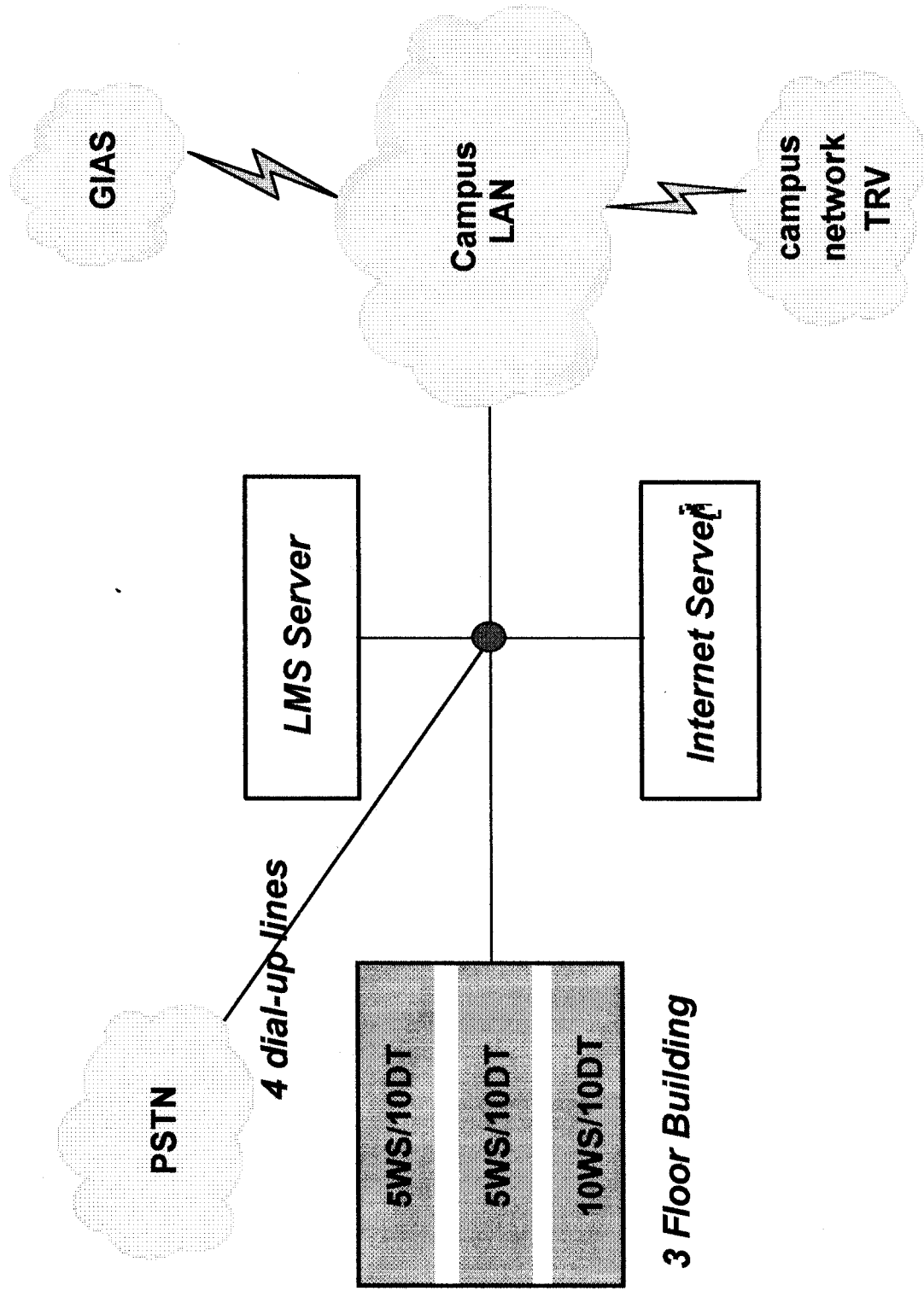
4. KAU Campus and Network Needs

The main campus of KAU is spread over an area of about 1.5 sq kms and includes central library, auditorium, academic departments of three colleges, research stations, administrative offices, residential complex and farming land. The buildings are located in different clusters. The buildings are connected by university roads. The buildings to be networked in the first phase are Central Library, Auditorium and Administrative block. Of this the Administrative block is located about 500 meters away from the Library cum auditorium Campus/cluster.

The three colleges and their departments in the main campus are housed in buildings which are quite separated from each other. This will require a considerable amount of outdoor cabling. Therefore the network architecture is to be chosen keeping in mind the environmental conditions and application needs within the buildings as well as outside. Ethernet technology is proposed to be used in KAU main campus because it provides most suitable, widely available and economical products for such an environment. Inside the buildings Unshielded Twisted pair (UTP) wiring (10 Base 10) will be used. It operates at 10 mbps, which is adequate for the desired applications. The outdoor cabling requires special attention – because not only are the distances large but also demand robust reliable and flexible cabling to provide for later up gradation in data speeds in tune with growing demands and technology trends (future proofing). Fiber optic cabling with adequate protection would be most appropriate for this purpose. Armored fiber optic cables will be buried in the ground for the long life.

For the KAU type of campus, star topology would be most suitable. Centre of the star will be co-located with Network Centre in the University Central Library. Schematic diagram of the proposed campus LAN is appended. Each building will be linked with the library building using 2 or 4 core fiber optic cables. In each building, a network access point will be identified where the optical fiber cable will terminate. At the network access point an UTP hub will be located to interface the twisted pair wiring inside the building with the outdoor fiber optic cabling. In the small buildings the twisted pair wiring will start from the network access point of that building. Other ends of these

KAU Trichur - Network Requirements



cables will terminate at the network nodes. (User computers). However for larger buildings an independent UTP network can be established using UTP hubs in cascaded fashion. In such cases, bridges will be used for linking the building network with the backbone fiber optic network. This will ensure isolation of local traffic and also avoid any problem arising out of cascading of UTP hubs. The above architecture is scaleable, easy to manage and if need arises the network data rates can be increased by upgrading the hub technology and access protocols. All the hubs will be provided with SNMP (Simple Network management Protocol) modules (thus making them 'intelligent hubs) so that the entire campus network can be monitored/ controlled from the network control Centre (using management workstation/PC).

The campus LAN of KAU can be linked with ERNET through leased links (64kbps), Public Switched Telephone Network (PSTN) and / other Satellite network based on VSAT technology with router acting as a gateway.

The proposed network at KAU Main Campus will provide a reliable networking infrastructure to meet the immediate needs in a cost-effective manner while also providing flexibility for up gradation to meet future needs. The campus LAN will be interconnected with ERNET Wide Area network (WAN) at the IP level to provide full range of IP services and thus the entire range of applications envisaged in Par 3 above over the Internet. Within the campus in addition to IP services, other LAN applications will be set up using a PC LAN technology with a dedicated file server. This will provide plat form for development and implementation of office automation applications. DOS and Unix applications will also work seamlessly with the Campus LAN

5. CAGI Deliverables

Of the above proposed main Campus LAN Initial phase covers the premises network of KAU Central library only and will consist of a plug and play type of network, with digital library and other ICT facilities. The project can be implemented through CAGI. The recommendations and solutions offered by CAGI if found acceptable can be implemented by the university also through any reputed ICT solution providers of public or private sectors available in the country like NIC, CMC, Symbiosis, DEC India, Compaq etc.

If entrusted to CAGI, deliverables for the project from it will be those among the following set of deliverables as part of a proposed network solution agreement with KAU:

- ? The design and architecture of the building LAN at the KAU Library premises.
- ? A working prototype model of the above network design.
- ? Assistance in the migration of the prototype model to a full function service.
- ? Management of the premises backbone network for high availability -over 99%.
- ? On-going system administration and maintenance of the end-to-end network.
- ? Training and development of in house personnel in network management stacks.
- ? Non-disruptive re-tooling continuum for emerging technologies and network expansion.
- ? Rapid implementation of new connections.
- ? Seamless integration into global networking infrastructure.
- ? Business Process Re-engineering for optimizing network transits.

5.1. KAU Requirements

KAU intends to build a Campus Network and Local Area Network within its Library building to offer online services to the agricultural community world-wide as well as its academic clientele within its premises. To implement this fabric, KAU requires consultancy on procuring and implementing the below mentioned communication stacks initially for the premises LAN of KAU Central Library.

- ? 50 graphical work stations
- ? 25 dumb terminals (ASCII)
- ? 4 concurrent dial-up connections
- ? application server for LMS
- ? Internet Server
- ? interface/gateway to premises network
- ? wide area connection to other 48 campuses spread over the length and breadth of the State(future)
- ? Internet (GIAS or INET) Link

The KAU library is housed in a four floor structure of approximately 4500 square meter and the access devices are expected to be scattered uniformly across the length, breadth and depth of this building. In the near future, connections to the sister

campuses are also envisaged. Besides, several users intend to dial through to the services recommended. Global access is planned through either VSNL/GIAS Internet facilities or through DoT/Inet X.25 packet switched connectivity.

KAU is currently hosting their Library Management System (LMS) software on a Pentium based computer which will be retained pending porting of the LMS application to other pure UNIX platforms. Additionally there is a need to host a full-blown Internet Server that will offer standard (ftp, telnet. http. news net.... et al) Internet based services to the local academic users.

6. Architecture Prescription

At the outset, it becomes obvious that the KAU requirement can be sustained initially within a single LAN collision domain. However, there is ample chance for it to grow rapidly through topology assimilation, aggregation and absorption into an Enterprise Network in the not too distant future. With this in mind, CAGI will chart and craft a technology, product and capacity plan that will emerge through modest beginnings and evolve in a non-disruptive migration continuum into an elastic and scaleable network that can easily imbibe any future local and cross-campus requirements of KAU.

Once the modalities and logistics of the local area segments were analyzed it became apparent that the ideal placement of the Library Hub node would be the second floor of the main library building complex with UTP (CAT -5) wiring encompassing the entire building with pervasive connectivity. As requirements mount, the secondary hubs could be distributed across each floor of the building and traffic aggregated to the central hub on the second floor as this would represent the optimal cabling pattern.

An option that appears viable would be to extend connectivity directly from the central server to the remote nodes through serial port expansions. Though it seems to be an attractive proposition, this; alternative suffers from the traditional problems of star-burst networking wherein scalability and growth are curbed if not inhibited. Such a solution would be confined to critical limitations in growth as there is a finite limit to serial port expansion. Besides, this solution will anchor the network to the server system, rendering the host system an intermediate network routing node which will place an onerous burden on it. Additionally, the below listed criteria taken in total should dispel the myth of its apparent viability and prompts us to eschew the alternative altogether.

- ? one serial port is multiplexed into 16 or 32 physical ports, severely impairing processor efficiency
- ? server availability is impaired due to the high records of failures of serial port expander cards
- ? network growth is inhibited due to the tightly coupled nature of serial port connectivity
- ? inter-operability of the overall system is severely impaired
- ? lack of any technology or capacity continuum –a total dead end solution
- ? the attached nodes are totally unmanageable
- ? lack of address mobility and addressing flexibility
- ? network cascading is severely impaired

The rigidity and inflexibility of this option renders it, in our opinion, unsuitable for commercial deployment, particularly when a high level of availability is sought. Besides, this option is only marginally cheaper than deploying a full-function terminal access server which makes it even less desirable considering the latter's enriched value to price ratio. Consequently, we would favor the terminal access server which can deploy the network in a loosely coupled manner thereby extending its reach in terms of availability, technology assimilation and capacity growth.

Consequently, a full-function Network Access Server that includes a Terminal Server will be deployed to address the required dial-up and local asynchronous terminal (ASCII) connections, Wide Area Networking into the campus network and the off-site campuses will be enabled through routing based solutions initially with the intent to migrate unobtrusively and seamlessly to more effective switching based solutions as the bandwidth and access requirements justify it. With this in mind a capacity continuum will be placed in perspective right from the start.

Considering that the incumbent Library Management System (LMS) is dependent on an Intel based platform, a Pentium Server will be configured to host this system that is anchored on the central hub. Alongside this machine, a more powerful engine (Alpha Processor) running a 64-bit UNIX Operating System will be placed to provide the required Internet Services, including a Bastion Host that secures the de-militarized zone (DMZ) of the intended firewall used to connect to the Internet. This machine is also expected to absorb the LMS function as and when it is ported to the Alpha based Digital UNIX.

Current capacity requirements only warrant a single segment LAN solution. As traffic and node populations grow this would move into the realm of multiple collision domains and thereafter into multiple broadcast domains mandating the transcendence to switching and virtual LAN technologies and topologies. Digital's enVISN architecture is a 'best of breed' solution for effecting this growth while retaining business investment. It starts at the low end with a stackable (DEC MultiStack) solution that mounts components on top of each other, interconnecting them with an integrated 'cable less' thin-wire connection and moves across a hybrid work-group chassis (DEChub 90) onto an enterprise multi-technology chassis (DEChub 900) that provides industry leading high performance access and configuration flexibility, providing a 5.6 Gb/s slot independent backplane that can assimilate and integrate diverse protocols, technologies and capacities, all in a single hub chassis.

Based on the paradigm engineered over enVISN, the next section will provide relevant details of two options we feel would 'right size' the technology path for KAU. The first would enter the ramp at the top of the low-end (MultiStack solution) while the other comes in at the bottom of the high-end (DEChub 900). The interim has been intentionally dropped as these neither represents a high synergy step in the migration path nor provide a true business case for KAU. The envisaged solution also presupposes the eventual migration of the dumb terminals to PC-based workstations and it is assumed that the population of dumb terminals is expected only to dwindle towards total extinction.

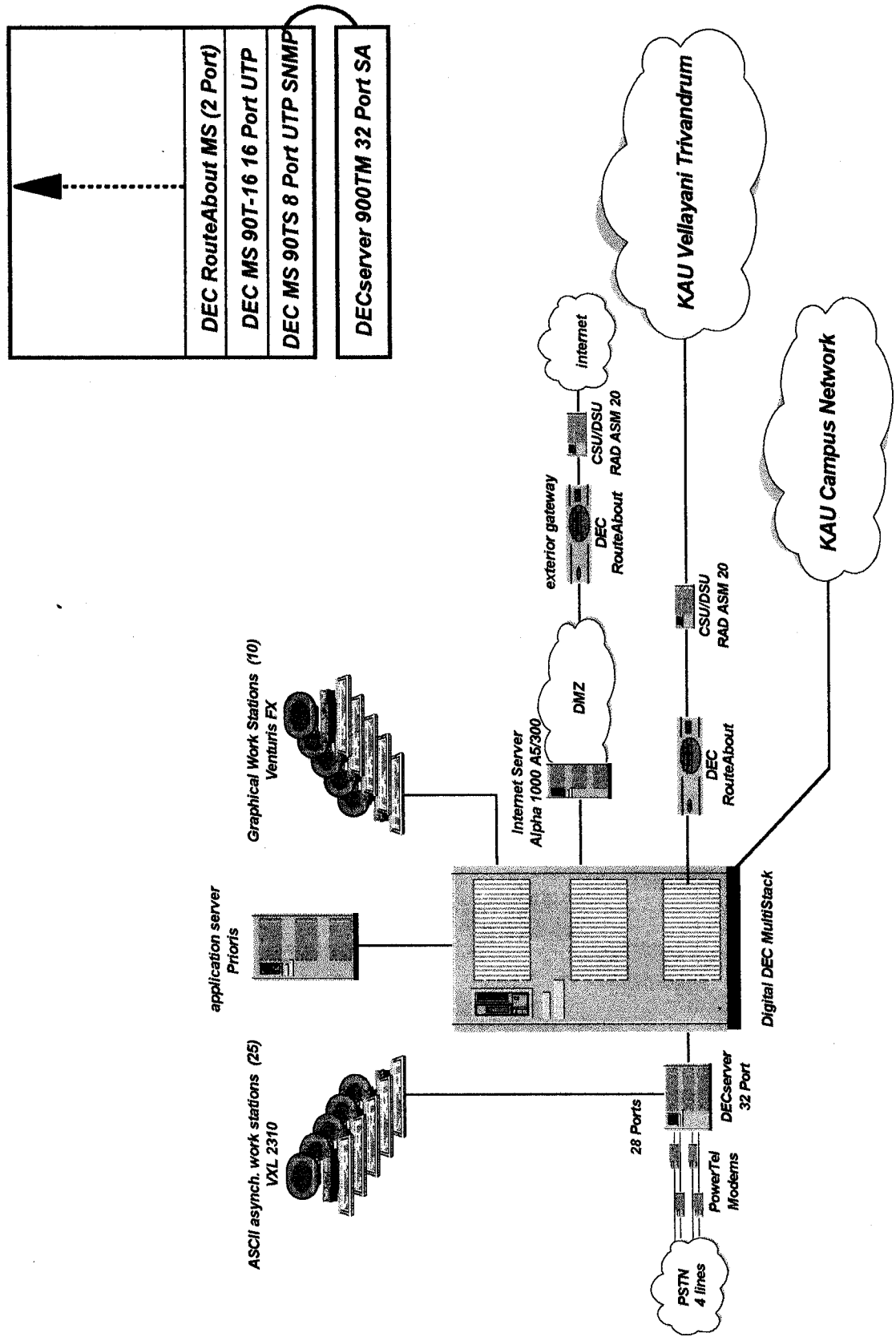
7. Network Design

In this report every measure has been taken to ensure that granular and layered SNMP based management is effected throughout the total solution to insure and ensure high availability and serviceability. Both of the options proposed are totally SNMP manageable and have been designed for high uptimes and fault tolerance

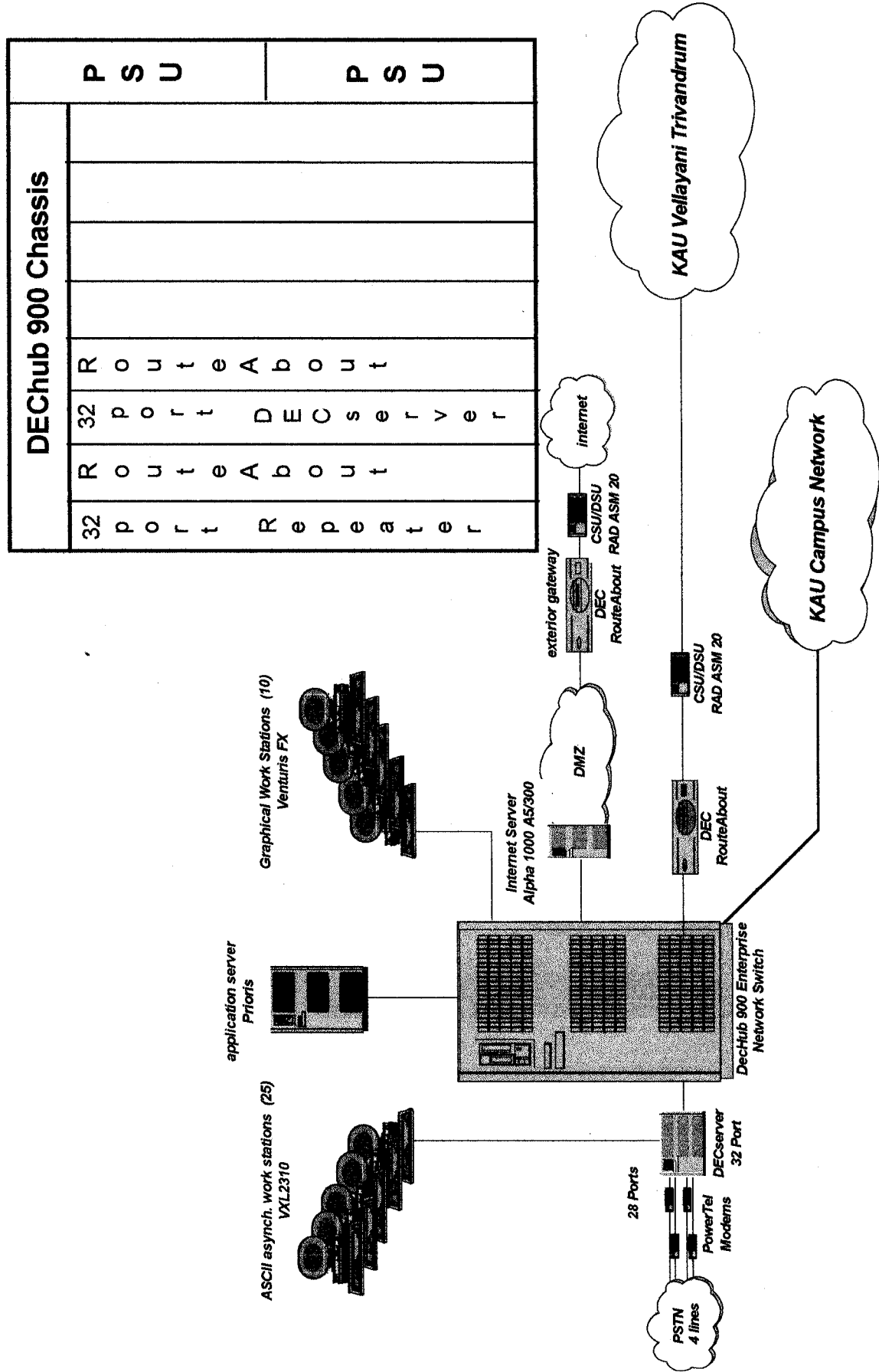
7.1. MultiStack Solution

Digital's MultiStack is a modular stacking system that provides efficient low-cost backdrops for building solutions for interconnecting small workgroups with low density traffic. It is a highly functional stacking solution that offers growth from the ground up, up to the range and power of the Enterprise solutions in enVISN. While retaining the low-cost continuum it holds the potential to migrate into high bandwidth networking over switched edges using Digital's 'router ready' switches. These stacks are 'hot

Kerala Agricultural University - Stackable



Kerala Agricultural University - Hubable



swappable', fault tolerant, easily configurable, cable less (backbone) and modular enough to sustain component reusability across the enVISN architecture range. Such a stack will anchor the first solution we are proposing.

A single segment, LAN of about 62 nodes will be synthesized using a Stack that comprises a pair of Ethernet UTP Repeaters and a pair of LAN-to-WAN routers for wide-area interconnection and integration. A stand-alone Remote/Local access server has been configured to address the dial-up and dumb terminal connectivity, deliberately so, as this represents the best initial outlay as well as investment protection for KAU when eventual migration to the Enterprise Chassis occurs.

The DECRepeater 90TS is an 8-port 802.3 repeater that houses a SNMP mediation device that controls all the repeaters chained downstream. As the first downstream repeater in the chain, a DECRepeater 90 T-16 has been configured to provide an additional 16 UTP connections that bring the total to 24, sufficient to address the initial requirements. An additional 14 such 16 port repeaters can be stacked to address future requirements.

DECserver 900 TM is an access server that supports 32 MJ8 based serial connections be it local or remote (dial-up). A stand-alone version of this hubable (DEChub 900) module will be mounted on a DEChub ONE docking station and connected into a repeater port to provide the backbone for serial connectivity. This server has one of the highest port density (32 ports) at the highest line speed of 115.2 Kb/s. Four PowerTel Boca MV34ED V.34 modems will be used to offer remote dial-up facilities while the remaining 28 ports will be used for connecting the dumb devices. As and when dumb devices disappear, their incumbent ports can be used for expanding dial-up access.

Wide-area connectivity will be established through a pair of DECRouteAbout EW Access modules, each supporting a pair of WAN (serial PPP, X.25, V.25 bis and Frame Relay) ports at T1/E1 speeds. These routers are Internet ready, remotely configurable, SNMP manageable and offer a suite of enhanced IP monitoring and control functions that include packet filtering, packet prioritization (protocol meshing) and bandwidth reservation. WAN ports on these routers will be connected to telematics media through RAD ASM-20 modems.

A standard industry rack has been proposed to house the entire network and the cabling structures. The networking components will be mounted on this rack and it is assumed that KAU will procure the necessary UPS and other power/air conditioning

equipments to insure continuous operation. 15 KVA UPS for each floor is advisable. This aspect has not been covered in this report. The proposal also contains the CAT-5 UTP cabling infrastructure components based on the concrete floor plans available. But the cabling manpower required is too speculative at this point to and its presence in this document is therefore intentionally withheld.

7.2. DEChub 900 Solution

Digital's DEChub 900 MultiSwitch enterprise hub chassis is a multi-technology, latest generation hub designed to provide support for large, complex networks ranging from Virtual LAN topologies to high-speed WAN backbones. It offers unparalleled high-performance multi-protocol access, configuration flexibility, superior security and granular SNMP network management over a 5.6 Gb/s backplane, representing Digital's and the industry's top end in the arena of backplane integration. With the recent advent of IPSwitching, the post-modern single-hop routed switching technique adopted in the GIGASwitch/IP module that sits in it, DEChub 900 is an ideal choice for technology assimilation and growth continuum.

Digital's DEChub 900 Multiswitch enterprise hub chassis is an 8 port chassis with 3 RISC processors, fans and redundant power supplies entirely slot independent, providing technology support for Classical and Fast (10 and 100 Mb/s) Ethernet, FDDI, ATM and future technologies like GIGAbit Ethernet.

The solution we are recommending based on this futuristic hub is in function quite identical to the MultiStack one retaining all the functional networking modules except the DECrepeater pair which has been promoted to a single 32-port (8 additional ports) DECrepeater 900 TM to eschew watering down the power and performance of the DECHUB 900. Otherwise, the major advantage unleashed by this solution is its elasticity and resilience to absorption of technology and capacity. The power, flexibility and performance of backplane integration should also be given due consideration when this option is reviewed.

7.3. Host Environment

We have recommended two specific configurations for the Internet Gateway Server, one based on a 233 MHz Alpha processor and the other on a 300 MHz engine. Details are attached in the appendix and either option is viable for the MultiStack solution

while we strongly recommend the bigger (Alpha Server 1000 A 5/300) machine for the DEChub 900 solution to retain the performance and power spectrum and continuum.

For hosting the LMS system, we have configured a Digital Prioris LX engine that is based on a 150 MHz Intel Pentium processor and in the absence of any existing LMS application benchmarks; it is believed that this machine would be sufficient. Should that be not, it can be easily upgraded into a higher engine (Prioris) until such time the entire system is ported to an Alpha based machine under Digital's UNIX Operating System.

Digital Archives of text, audio, video and other files will be spread through a JVC juke box with 600 CD capacity (640 GB), a TODD CD Server; drive based of 100 drive (64 GB) and hard disk based of Meridian 100 GB Server, all the three connected to the network.

JVC Jukebox a DVD based storage device can offer a great deal in terms of mass storage. It is designed to provide a clean, secure housing for disc media, without being over- engineered. The robotic mechanism itself is very straightforward and hence reliable. The libraries are available in different sizes, with varying storage capacities. The clean lines of the enclosure hide a mechanical construction which is both robust yet light, and which has been geared for heavy network traffic. Therefore the DVD jukebox is a prime candidate for use in large-scale storage requirements. All operational controls are available from the front panel. Bulk loading is provided in the form of compact magazines each holding 50 discs, whilst a "letter box" mechanism allows for the easy insertion and removal of individual discs. For KAU Library 600 CD Capacity will be sufficient for the initial phase.

CD/DVD Server provides access to CD/DVD-ROM applications anytime, anywhere. Combining the power of an enterprise-class CD/DVD-ROM networking system with the manageability and ease of use of a thin server, the CD/DVD Server can give thin client access to CD/DVD-ROM applications via the Internet and wide area network- as well as across any intranet or LAN. Users can access CDs and DVDs from any workstation- CD/DVD Servers are platform independent. Meridian 100 CD Capacity Server is recommended for KAU. It can give CD-R capability, Macintosh HFS support, and all management and administration tools in one location, including application metering & queuing, license control custom menu structure and group access permissions.

As end user workstations we have configured a Digital Venturis FX Series machine, regarded one of the best of its kind in the industry with no parallels in price-to-performance ratios. A detailed look at the configuration proposed is available in one of the attached sheets.

A standard VXL 2310 station that emulates a DEC VT220 UNIX station will serve as the dumb terminal, the specifications of which amply meet the requirements.

8. Financial Terms

The Cost of Materials (BoM), attached to this document, presents the totally managed MultiStack and Hubable options from Digital. While there is a choice in the active components prescribed in the two network options, the passive cabling solution and the hosts attached to the network would be retained across the selections. Consequently, KAU should add the passive components, server and workstation costs to the cost of the selected network option (Hubable or Stackable) to derive the financial outlay necessary. The final analysis of the various options is listed towards the end of the Cost of materials spreadsheet.

8.1. Implementation Methodology

The project can be implemented by KAU by sub contracting of various parts of implementation (such as cabling, equipment supply, testing etc) to various parties based on proprietary or limited tender basis to meet the intended tight implementation schedules in a cost effective manner. A more effective alternative is to give the job of purchase, installation and commissioning of equipment and user training as a system engineering effort to CAGI or some reputed public sector or private sector undertaking in the field like CMC, DEC, Symbiosis etc for identifying the detailed list of components and sub systems required for the project. CAGI can voluntarily act as consultants to KAU to ensure that original design and identification of components/sub systems is sound and subsequently to provide advice on procurement, installation, commissioning, testing, training and application development supervision so that the subcontractors /system engineering agency is properly guided and the best interest of KAU is protected. CAGI can also assist in upgrading the existing PCs to become suitable for network use and also in identifying general purpose productivity software for use within KAU Network.

If CAGI is entrusted with the project it is customary for CAGI to eschew 'street' discounts against compensation for the project management and installation efforts we expend to deliver a comprehensive solution. We sincerely believe that our customers, as has invariably been the case so far, prefer this open and straightforward approach to the seemingly lucrative, though quite deceptive discount offers tendered by commercial service providers and vendors in the industry. The value addition our approach brings can be summarized as below.

- ? total project management
- ? free installation of hardware and software
- ? extended warranty coverage
- ? 24-hour support and Help Desk Facility
- ? on-site training
- ? structured cabling design and supervision
- ? elaborate documentation
- ? IP subnet and addressing structure design
- ? ongoing support continuum for a nominal fee
- ? ongoing AMC (only for Digital components) at 65% of standard Digital coverage rates

8.2. Installation/Support Continuum

The technology alliance that CAGI will enter into with DEC will translate into responsive delivery of installation, warranty maintenance, spare parts inventory and annual maintenance efforts at a fraction of the cost various commercial groups offers in the country. This would infuse a distinct advantage into this proposal and bring to KAU a framework that ensures the right-sizing of technology, rapid provisioning of networking stacks (LAN, wide-area and Internet) and responsive attention to problems, whereby unsurpassed high availability.

8.3. Network Synthesis and Integration

The initialization and customization of the entire network proposed, including the attachment of the host environments, the IP-sub netting implementations and the integration of the LAN into the structured cabling proposed will be executed by our provisioning arm, CIRD or groups associating with it at no additional cost to KAU.

8.4. Systems Engineering (SE) Support

CIRD will provide all the SE support required to take the solution to operational readiness free of cost, except premises cabling for which we will provide the management and technical inputs necessary. Once operational, a new contract based on an annual solution maintenance insurance scheme can be worked out to ensure technology and support continuums. As part of the other existing contracts, CAGI and CIRD will provide the below mentioned; till commercial inception and thereafter for a nominal annual support fee.

- ? network installation, configuration and customization
- ? supervision and management of structured cabling necessary
- ? configuration of all hubs, repeaters access servers and routers
- ? pager coverage with on-site presence within 24 hours during warranty period
- ? SNMP agent integration
- ? access to the CIRD help desk at Tellycherry for problem reporting
- ? off-site network management and problem determination over dial-up lines
- ? technology and capacity retooling continuum
- ? training of KAU staff on the solution provided for site management coverage

8.5. Commercial Terms and Conditions

The proposal has been drafted under the assumption, that KAU is eligible for customs duty exemption (CDE). KAU is expected to produce documents pertaining to customs duty exemption when required.

8.5.1. Prices

The prices quoted are inclusive of customs duty and excise duty wherever applicable as prevailing on the date of the commercial quotation. If there is any increase in any of the statutory duties like customs duty, excise duty etc. and which become leviable before the date of delivery the rates would stand modified to that effect and that amount. Octroi will be extra where applicable.

The quoted prices are inclusive of systems engineering fees, except the labor charges for premises cabling efforts.

8.5.2. Validity

A formal Quotation is to be obtained from CAGI or other groups to whom the project is entrusted with. This cost estimated in this proposal is at the market rates of June 1996.

8.5.3. Purchase Order

It is advisable that Purchase orders for Digital equipments should be placed directly, with Digital Equipment (India) Ltd. Their address is Digital Equipment (India) Limited, Rubiyan, 1st Floor, Arangath Road, Ernakulam, Cochin- 682 018

8.5.4 Delivery

Delivery by any firm may require a period of 8 to 10 weeks in the case of foreign equipments and 6 to 8 weeks for those manufactured in India from the date of issue of a technically and commercially clean order from KAU.

- ? It will become essential to allow Transshipment/part shipment for foreign equipments.
- ? Immediate negotiation of documents on the date of shipment will be very important.
- ? Port of entry in India may be Cochin.

8.5.5 Payment Terms

Payment should be made as an on-sight, 100% irrevocable LC (60 days DA) and in USD favoring Digital Equipment Hongkong Limited or others as specified by the group to which the project will be entrusted.

As per the existing conditions Digital Alpha Servers and Networking components from DEC carry one year comprehensive warranty against defects arising out of faulty design, materials and workmanship for a period of 13 months from the date of dispatch or 12 months from the date of installation whichever is earlier. All the Venturis and Prioris components carry coverage of 36 months from the date of installation.

CAGI if it undertakes the project will provide one year warranty against all implementation and integration defects of the final solution from the date of commercial deployment.

9. Time Frames & Administrative Arrangements

KAU is required to recommend realistic time frames as per their requirement and priorities.

An ICT Task Force to be chaired by Vice Chancellor with the University Librarian functioning as Convener may be created. The membership should be compact. Capability rather than representation should be taken as the basis of membership. Software licensing and network configuration should be handled by the task force. Volunteer faculty members of librarians should be entrusted with the coordination of activities in different campuses/buildings.

ESTABLISHMENT OF KERALA AGRICULTURAL UNIVERSITY: CAMPUS WIDE INFORMATION SYSTEM AND NETWORK

Feasibility Report

APPENDICES

Detailed Write Ups on the Hardware and
Software Systems Recommended and their
Technical Specifications

Networking Option (DEChub 900)					
Component Description	Quantity	Unit Price	Total (CDE)	Unit (INR)	Total (INR)
DEChub 900 with one power supply	1	\$5,450	\$5,450		
Power Supply for DecHub900 (additional)	1	\$1,350	\$1,350		
DECrepeater 900TM 32 Port Ethernet Module (UTP)	1	\$4,090	\$4,090		
DECserver 900TM Remote Access Server (32 Ports)	1	\$6,390	\$6,390		
DEC RouteAbout Access EW with multiprotocol software	2	\$2,680	\$5,360		
clearVISN Multi-Chassis Manager with Router Configurator	1	\$1,320	\$1,320		
RAD ASM-20 V.35 64 kbps Modems	2			Rs 46,500	Rs 93,000
PowerTel Boca MV34ED V.34 28.8 kbps MNP-10 Modems	4			Rs 13,850	Rs 55,400
Patch Panel	1			Rs 2,750	Rs 2,750
Patch Panel Inserts	6			Rs 2,750	Rs 16,500
Patch Cables	80			Rs 120	Rs 9,600
Wall Boxes - Face Plates (kit of 8)	16			Rs 2,850	Rs 45,600
CAT-5 UTP Cable PVC Wire Reel (303 mts.)	5			Rs 8,500	Rs 42,500
19" Industry Rack (President Systems) with 2 Fans	1			Rs 48,000	Rs 48,000
Totals (all prices are in US Dollars)			\$23,960		Rs 313,350
Networking Option 2 (MultiStack)					
Component Description	Quantity	Unit Price	Total (CDE)	Unit (INR)	Total (INR)
MultiStack 90T-16 16 port Manageable	1	\$1,330	\$1,330		
MultiStack 90TS SNMP module (8 Ports)	1	\$1,460	\$1,460		
DECserver 900TM Docking Station (AUI) + Transceiver	1	\$390	\$390		
DECserver 900TM Remote Access Server (32 Ports)	1	\$6,390	\$6,390		
DEC RouteAbout Access EW IP Stackable	2	\$2,680	\$5,360		
clearVISN Stack Manager with Router Configurator	1	\$660	\$660		
RAD ASM-20 V.35 64 kbps Modems	2			Rs 46,500	Rs 93,000
PowerTel Boca MV34ED V.34 28.8 kbps MNP-10 Modems	4			Rs 13,850	Rs 55,400
Patch Panel	1			Rs 2,750	Rs 2,750
Patch Panel Inserts	6			Rs 2,750	Rs 16,500
Patch Cables	80			Rs 120	Rs 9,600
Wall Boxes - Face Plates (kit of 8)	16			Rs 2,850	Rs 45,600
CAT-5 UTP Cable PVC Wire Reel (303 mts.)	5			Rs 8,500	Rs 42,500
19" Industry Rack (President Systems) with 2 Fans	1			Rs 48,000	Rs 48,000
Totals (all prices are in US Dollars)			\$15,590		Rs 313,350
Servers and Workstations					
Component Description	Quantity	Unit Price	Total	Unit (INR)	Total (INR)
Digital Venturis FX Workstations	10	\$1,870	\$18,700		
Digital Priors 5150 LX	1	\$4,785	\$4,785		
VXL 4310 ASCII VT220 dumb terminals	25			Rs 14,500	Rs 362,500
Total for LMS Server and Workstations			\$23,485		Rs 362,500
AlphaServer Bundle Configuration					
Component Description	Quantity	Unit Price	Total	Unit (INR)	Total (INR)
AlphaStation 1000A 5/300 Base System Bundle (base configuration attached)	1	\$12,805	\$12,805		
64 MB Memory					
2 MB ECC cache					
600 MB CDROM drive					
UNIX base (2-user) licence					
Integrated Graphics Card					
UNIX Keyboard and 3-button Mouse					
15" Color Monitor	1	\$600	\$600		
4 GB Wide SCSI Hard Disk for Alpha 1000A	1	\$1,725	\$1,725		
Table-top 8 GB DAT Drive	1	\$1,555	\$1,555		
SCSI Cable for DAT Drive	1	\$45	\$45		
UNIX Licence - 8 Users	1	\$1,800	\$1,950		
Total System Price			\$18,680		
Total Price for Hub Option			\$66,125		Rs 675,850
Total Price for Stack Option			\$57,755		Rs 675,850
Contract Value in INR for EMD calculation (1 USD = INR 35, Stack Option)					Rs 2,697,275



AlphaServer 1000A system

High performance, expandability, clustering, and more -
offering unparalleled value

**Looking for a robust, reliable solution for your
heavy-duty I/O requirements?**

**The AlphaServer™ 1000A system has everything you
need, including a high-performance Alpha processor,
seven PCI slots that give you room to grow, -cluster power
for high availability and ServerWORKS™ software for easy
system management. And that's only the beginning.**

- Serial-link remote management lowers your support costs
- Choice of robust, mission-critical operating systems: Digital UNIX®, Windows NT™ Server, or OpenVMS™
- Best suited for:
 - Database server
 - Internet server
 - Application server
 - PC LAN server

Ample elbow room

You'll find the AlphaServer 1000A system to be the most expandable server in its class. With up to 1 GB of ECC memory. And more than 28 GB of internal hot swap storage. And 9 industry-standard expansion slots, including 7 PCI slots, for those with large disk farms or I/O-intensive applications. The system can handle all that you demand, with room to spare.

If you prefer the small footprint of a rackmount system, the AlphaServer 1000A system is also available in a space-saving cabinet, which is ideal for cluster solutions.

The future is built in...

The AlphaServer 1000A system is designed to protect your investment in hardware and software. Its daughter card CPU architecture and design are fully compatible with future generations of Alpha chips, so your server can be easily upgraded to higher-performance processors as your business grows.

- 64-bit Alpha processor delivers unparalleled performance and value
- 9 industry-standard slots to connect low-cost, high-performance options - 7 PCI, 2 EISA
- On-board, Fast Wide SCSI for enhanced disk access
- Expandable and flexible, with room to grow
 - Up to 1 GB memory
 - 28 GB internal storage (440 GB total)
- Highest-performing, most reliable cluster-ready systems in the industry
- ServerWORKS software to manage SNMP-based distributed network environments

ALPHA™
GENERATION





Cluster power

Need a bet-your-business server that doesn't deplete your budget? Digital offers the most reliable servers in the industry.

The AlphaServer 1000A system is the only low-end server in the industry to offer fully redundant power supplies, ECC (error correction code) memory and cache, and a dual SCSI backplane.

We invented clustering technology as an added safeguard for your data. Clustering provides high availability, manageability, and performance across your entire computing environment.

Next step

For information about the AlphaServer 1000A System, contact your Digital representative or an Authorised Business Partner. For online information, check out the AlphaServer Home Page at - <http://www.digital.com/info/alphaserver>

AlphaServer 1000A system

CPU Features

No. of processors	1
Clock speed	300 MHz
Cache size on chip	16 KB I-cache, 16 KB D-cache
Secondary cache	2 MB ECC
In-cabinet upgrade	Yes

Performance

SPECint95®	8.48
SPECfp95®	9.84

I/O

Max. memory	1 GB ECC
Max. storage, internal	28 GB
Max. storage, total	440 GB
Max. I/O throughput	PCI: 132 MB/s EISA: 33 MB/s

I/O support

7 PCI slots, 2 EISA slots

Options

Networking	Ethernet, Token Ring, FDDI, X.25, SNA, TCP/IP, DECnet/OSI, WAN
Storage	FAST SCSI-2, FW SCSI-2, FWD SCSI-2, RAID, DSSI (OpenVMS only), Prestoserve™ (Digital UNIX only)
Availability features	Auto reboot, thermal management, remote system management, RAID, disk hot swap, dual SCSI backplane, memory failover, ECC memory, ECC cache, error logging, optional redundant power system, optional uninterruptible power supply (UPS)

Operating systems

Digital UNIX*, OpenVMS, Windows NT Server

Operating environment

Temperature	10°C to 40°C (50°F to 104°F)
Relative humidity	20% to 80% (noncondensing)
Power supply	450W (optional second supply for redundancy)

Physical characteristics

Height	44.2 cm (17.4 in)
Width	35.8 cm (14.1 in)
Depth	57.1 cm (22.5 in)
Weight	187.4 kg (85 lb)

* Digital UNIX Version 3.2 on Alpha is an X/Open UNIX '93 branded product.

Features may differ among operating environments. Performance may vary depending on configuration, application, and operating environment.

Digital believes the information in this publication is accurate as of its publication date; such information is subject to change without notice. Digital is not responsible for any inadvertent errors.

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Digital Equipment (India) Ltd., (a subsidiary of Digital Equipment Corporation, U.S.A) Digital Park, 92 Industrial Suburb, II Stage Yeshwanthpur, Bangalore - 560 022.

Alpha Server Configuration

Digital AlphaServer 1000A 5/300 Application Server

- Single 300 MHz Alpha 21164 Processor
- 16 KB I-cache; 16 KB D-cache
- 2 MB ECC secondary cache
- Daughterboard upgrades to 333, 400 and 500 MHz
- 128 MB Main Memory (64 MB on-board + 64 additional)
- 4 GB SCSI Hard Disk Drive
- 15" Color Monitor
- Keyboard and 3-button Mouse
- 600 MB CDROM Drive
- 8 GB table-top DAT Drive
- SCSI Cable and Power Cord
- 10 Mb/s 802.3 PCI Ethernet(UTP) Interface Card
- 20 SIMM memory slots, expansion to 1 GB
- 28 GB max. internal storage
- 440 GB total addressable storage
- Pedestal Enclosure with 7 PCI; 2 EISA and 1 PCI/EISA slot
- On-board Fast Wide single-ended SCSI-2 controller (wide/narrow)
- On-board SVGA Graphics controller
- 10 storage slots - 1 1.44 FDD drive, 1 CDROM, 7 HDD, 1 removable media
- 450 watt power supply
- 2 Serial ports (full duplex, asynch. modem control)
- 1 bi-directional enhanced parallel port
- PS/2 style keyboard and mouse ports
- EISA Configuration Utility
- Integrated Advanced Server Management with ServerWorkS
- Performance Benchmarks
 - ✓ **SPECint95=8.48**
 - ✓ **SPECfp95=9.84**

digital

AlphaServer™ 2000 systems

Scalable SMP, mission critical availability and cost-effective performance



You can depend on the AlphaServer 2000 systems when you need to expand your computing capabilities to keep up with the growth of your business.



The AlphaServer 2000 systems – the 4/275, 5/250 and 5/300 servers – deliver the price/performance that productivity-obsessed businesses require today, with exceptional expandability to keep up with changing needs tomorrow.

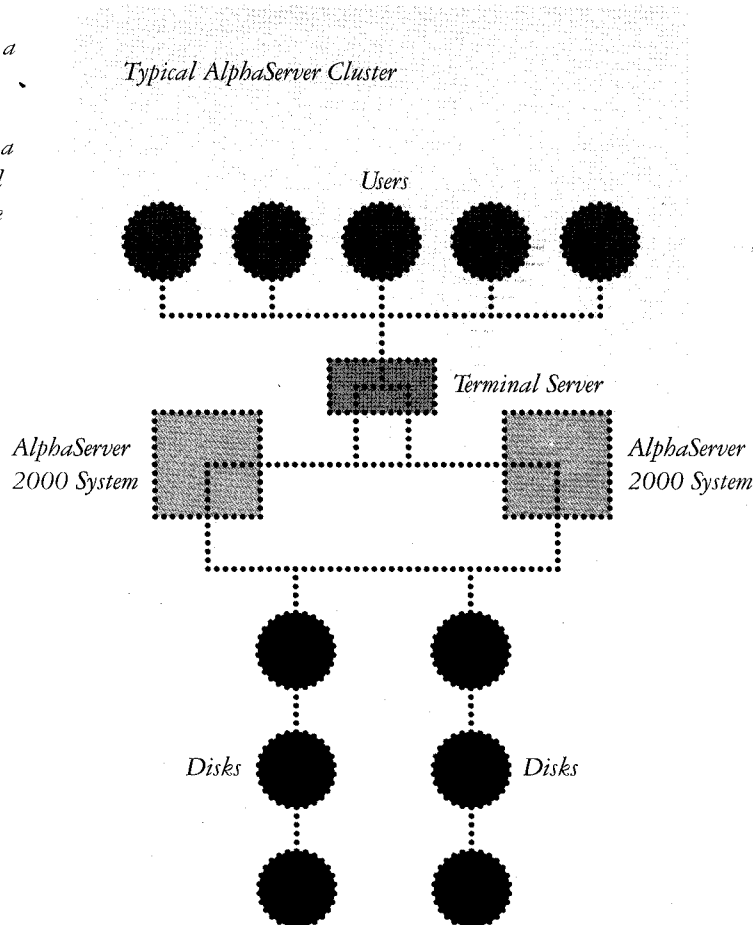
- Industry-leading 64-bit RISC with symmetric multiprocessing (SMP)
- Optional second processor for throughput of up to 2400 transactions per minute
- Up to 1 GB memory, up to 4 TB storage to grow as your business does
- 10 PCI and EISA ports for low-cost, industry-standard I/O options
- Digital UNIX®, OpenVMS™, or Microsoft® Windows NT™ Server; gives you access to thousands of applications
- OpenVMS, UNIX clustering; create larger, highly available computing environments
- 3-year on-site hardware warranty, next-business-day response; our commitment to AlphaServer excellence
- Best applications:
 - Commercial application server
 - PC LAN server
 - Database server/high availability
 - Technical applications
 - Internet server

AlphaServer 2000 systems

Scalable SMP, mission critical availability and cost-effective performance

If you run a growth-minded business that's ready to consider a cost-effective server solution, consider the AlphaServer 2000 systems – the 4/275, 5/250 and 5/300 servers. They provide high productivity and cost-effective solutions, while protecting your valuable business information.

You can manage multiple AlphaServer 2000 systems as a single unit by clustering them. Immediately, you have a self-contained backup system, and a way to balance your workload automatically across the entire server environment.



Who can use an AlphaServer 2000 system? Businesses that seek high reliability, availability, superior growth potential, and exceptional price/performance that lowers the cost of doing business. Of course, that covers a lot of ground.

An AlphaServer 2000 system can function as a commercial application server for office automation, financial applications, and other small- or medium-size business operations. As a database server, it can provide transaction processing and highly available computing environments for financial firms, banks, insurance companies, and health care facilities. As a PC LAN server, it can support industry-standard operating systems for professional and service-oriented applications. It can function as a cost-effective compute server for such technical applications as modeling, parallel applications, and process control. And for larger commercial Web sites, it's the perfect Internet server.

Double time

What's better than a high-speed processor? Two of them. The AlphaServer 2000 systems enable you to add a second processor, for twice-as-fast

turnaround times on whatever projects your people are working on.

Add a second 275 MHz processor to the 4/275 system, and you're churning through 1500 TPM (transactions per minute); add another 300 MHz processor to the 5/300 system, and your processing speed reaches a truly impressive 2400 TPM. This ability to complete more work in less time gives you an immediate competitive advantage in the real-world environment of "I needed it yesterday."

Extensively expansive

The memory, storage, and I/O numbers of the AlphaServer 2000 systems certainly bear out the expandability promise. Memory doesn't max out until you reach 1 GB. Internal storage grows to 34.4 GB and can expand externally up to 4 TB.

On the I/O side, ten PCI and EISA slots give your server ample room for adding whatever low-cost, industry-standard peripherals work best for your needs. Translation: Whatever you need on the server, you can have on the server.

Also, by clustering multiple OpenVMS or UNIX systems, you can create even larger, highly available computing environments – and expand them easily and cost-effectively. All this added performance means that you can approach business problems differently, and solve larger, more complex issues than were possible before.

Thousands of programs

The AlphaServer 2000 system fits right into your work environment, because it can accommodate just about any software you're currently running. Thanks to a choice of three operating systems – Digital UNIX, OpenVMS, or Windows NT Server – the server can run a wide range of applications.

A system to rely on

When your system is down, your business is down. That's precisely why the AlphaServer 2000 system offers availability features that maximize uptime. Auto reboot, thermal management, ECC cache and memory, redundant power system, and remote system management are all standard. And internal RAID cost-effectively organizes your disk data and improves performance, data integrity and security—all in a space-saving package. It makes for a cost-effective, space-saving, and secure solution for your business's high-integrity data.

3-year on-site warranty

For our AlphaServer family, Digital has set a new standard in customer service and support, by bundling in a 3-year hardware warranty. The AlphaServer 2000 systems are no exception. If your system should need any service for a full three years after purchase, you can count on Digital to be on your site by the next business day. It's this kind of industry-leading service that further demonstrates our confidence in our AlphaServer systems...and our commitment to your total satisfaction.

A range of services

Digital and its partners offer the broadest range of support services in the industry. Whether you require training, consulting, network integration, software support, or comprehensive system maintenance, Digital is the single-source solution to meet your needs.

Your next step

Looking for a server that delivers the price/performance that productivity-obsessed businesses require today, with exceptional expandability to keep up with changing needs? Check out the AlphaServer 2000 systems – the compact servers with plenty of growth potential. For information by fax, call 1-800-DIGITAL via a touch-tone phone (1-908-885-6426 outside the U.S. and Canada). For on-line information, visit our AlphaServer Web site at <http://www.digital.com/info/alphaserver>

AlphaServer 2000 systems

	4/275	5/250	5/300
CPU Features			
No. of processors	Up to 2	Up to 2	Up to 2
CPU/Clock speed	21064/275 MHz	21164/250 MHz	21164/291 MHz
Cache size on chip	16 KB I-cache, 16 KB D-cache	8 KB I-cache, 8 KB D-cache	8 KB I-cache, 8 KB D-cache
On board cache (per processor)	4 MB	4 MB	4 MB
In-cabinet upgrade	Yes	Yes	Yes
Performance			
Transactions per minute	Up to 1500	Up to 2000	Up to 2400
SPECint92™	200.1	277.1	319.3
SPECfp92™	292.6	410.4	477.3
I/O			
Max. memory	1 GB	1 GB	1 GB
Max. storage, internal	34.4 GB	34.4 GB	34.4 GB
Total Storage	Up to 4 TB	Up to 4 TB	Up to 4 TB
Max. I/O throughput	PCI: 132MB/sec. EISA: 33MB/sec.	PCI: 132MB/sec. EISA: 33MB/sec.	PCI: 132MB/sec. EISA: 33MB/sec.
I/O support	3 PCI slots, 7 EISA slots	3 PCI slots, 7 EISA slots	3 PCI slots, 7 EISA slots
Internal storage	8 hot swap disks (16 GB), 2 removable media, floppy disk, RAID 0, 1, 0+1, 5		
Options			
Networking	Ethernet, FDDI, Token Ring, synchronous comms.		
Storage	Fast SCSI-2, FW SCSI-2, FWD SCSI-2, RAID, DSSI (OpenVMS only), Prestoserve™ (Digital UNIX only)		
Availability Features			
System	Auto reboot, thermal management, redundant power system, remote system management, RAID, disk hot swap, dual SCSI backplane, memory failover, ECC memory, ECC cache, SMP CPU failover, error logging, optional uninterruptible power supply		
OpenVMS clusters	Ethernet, DSSI, FDDI		
AdvantageCluster™ (UNIX)	DECsafe™ ASE		
Operating Systems			
	Digital UNIX, OpenVMS, Windows NT Server		
Operating Environment			
Temperature	10°C to 40°C (50°F to 104°F)		
Relative humidity	20% to 80% (noncondensing)		
Power supply	Two 400W supplies		
Physical Characteristics			
Height	60.5 cm (23.8 in.)		
Width	43 cm (16.9 in.)		
Depth	65 cm (25.6 in.)		
Weight	54 kg (109 lbs.)		
Hardware Warranty	Three-year on-site; next-business-day response time. (Warranty may be upgraded to enhance your coverage.)		

Features may differ among operating environments. Performance may vary depending on configuration, application, and operating environment.

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When you need a high-performance workgroup server with high functionality, but at a desktop PC price, then your intelligent choice is the award-winning Prioris™ LX server. Perfect for small networks or branch offices, the Prioris LX server comes with up to 200MHz Pentium® processor power and is packed with manageability and performance features found nowhere else at an entry-level price.

- 120MHz, 150MHz and 200MHz Pentium® processors available.
- ECC memory configuration available as an option.
- Integrated Fast SCSI-2, E-IDE and Ethernet controllers.
- Quad-speed CD-ROM drive.
- 256KB secondary cache.
- Three-year warranty.

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Prioris™ LX

Features

MODEL/PROCESSOR/SPEED

- Prioris™ LX 5120
120MHz Pentium® processor
- Prioris LX 5150
150MHz Pentium processor
- Prioris LX 5200
200MHz Pentium processor

SYSTEM MEMORY

- 16MB to 192MB parity memory

CACHE MEMORY

- 256KB async cache standard

INTEGRATED FEATURES

- PCI Fast SCSI-2 (Narrow) controller
- PCI Enhanced IDE (4 devices) controller
- PCI Full Duplex Ethernet controller
- Cirrus 5428/5429 SVGA graphics controller with 512KB DRAM standard

SLOTS

- 6 total (all available):
-2 PCI full-length
-1 PCI/EISA full-length
-3 EISA full-length

BAYS

- 6 total:
-1 3.5" front-accessible low-profile
(1.44MB diskette drive installed)
-3 5.25" front-accessible half-height
(two available)
-1 3.5" internal half-height
-1 3.5" internal low-profile

EXTERNAL PORTS

- 1 enhanced parallel (ECP/EPP)
- 2 high-speed 16550-compatible serial
- 1 SVGA graphics
- 1 keyboard
- 1 mouse
- 1 Fast SCSI-2
- 1 Ethernet (10Base-T or 10Base-2)

CD-ROM DRIVE

- 5.25" 4x SCSI CD-ROM drive standard

CERTIFIED OPERATING SYSTEMS

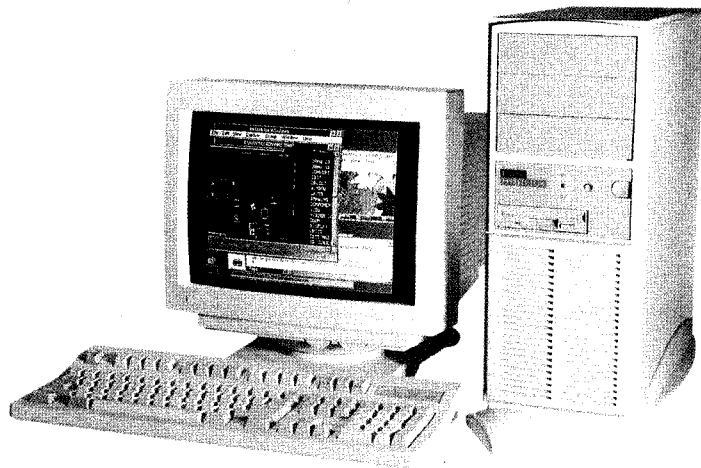
- Windows® NT™ Server™, Windows NT Workstation™, Novell™ NetWare™, Digital PATHWORKS™, SCO® UNIX®, Banyan® VINES™, Windows for Workgroups™, IBM OS/2®, MS-DOS® and Windows®

POWER SUPPLY

- 300W, 110V/220V autosensing

DIMENSIONS

- Height: 17" 430mm
- Width: 7" 180mm
- Depth: 17" 430mm
- Weight: 28.4 lb 12.9kg (without hard drive)



OTHER STANDARD FEATURES

- Flash BIOS
- Two low-noise, variable-speed fans
- Easy-access, no-screws enclosure

MULTILEVEL SECURITY

- Mechanical chassis lock
- Case lock-down ring
- Two levels of power-on password protection

MANAGEABILITY

- ServerWORKS™ Quick Launch
- ServerWORKS Manager, which includes ServerWORKS™ workgroup administrator, ServerWORKS Manager application and SNMP agents to manage Novell NetWare 3.12 or 4.1, Microsoft Windows NT 3.51 or SCO UNIX Rel. 5

REGULATORY CERTIFICATIONS

- EMI/safety: UL-listed, CSA, CE Mark, FCC-B, VCCI, CISPR-22 (class B), N-Mark (NEMKO), S-Mark (SEMKO), D-Mark (DEMKO), FI-Mark (SETI), Korean, Eastern Europe

WARRANTY

- Three-year, on-site, next-business-day response**

Options

POWERGRADE™ UPGRADES

- Processor or board upgrades are available to 200MHz

REMOTE SERVER MANAGER

- EISA controller plus management station software
- Remote features: system boot/reset, alerting, diagnostics, CMOS updates, file upload/download, remote paging

SYSTEM MEMORY

- 8, 16, 32 or 64MB parity upgrade kits
- 32MB ECC upgrade kits

SECONDARY CACHE

- Upgrade available to 512KB sync

DISKETTE DRIVES

- 3.5": 1.44MB, 2.88MB
- 5.25": 1.2MB

HARD DISK DRIVES

- PCI E-IDE: 850MB, 1.2GB
- Fast-Narrow SCSI: 1.0GB, 2.0GB, 4.0GB
- Fast-Wide SCSI*: 2.0GB, 4.0GB

SCSI ADAPTERS

- Adaptec 2940 PCI SCSI-2 host adapter
- Adaptec 2940W Fast-Wide PCI SCSI-2 host-adaptor

TAPE DRIVES

- QIC: 2.5/5GB
- DAT: 4/8GB

RAID CONTROLLER

- PCI RAID – 1 channel

MONITORS

- SVGA NI auto-sync color: 14" (13.4"V),
- 1280 x 1024 SVGA NI auto-sync color: 15" (14.0"V), 17" (16.2"V), 17" (16.0"V)
- 1600 x 1200 SVGA NI auto-sync color: 21" (19.6"V)

NETWORK INTERFACE CARDS

- Ethernet PCI
- Ethernet EISA
- Token Ring EISA

COUNTRY ACCESSORY KIT

- Keyboard, mouse, documentation and power cord

* Fast-Wide SCSI controller required.

** Certain restrictions and exclusion apply.

For more information about Digital's Enterprise Computing expertise visit us at

<http://www.windows.digital.com>

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Specifications for PC - Prioris 5150 LX

Processor	:	Intel Pentium
Clock Speed	:	150 Mhz
System Memory	:	32 MB - Expandable to 192 MB
Cache Memory	:	16 KB Internal Cache
Monitor	:	14" SVGA Color Monitor
Graphics	:	Integrated SVGA Graphics Controller Cirrus 5428 Video Controller 1024 x 768 at 16 Colors
Video Memory	:	512 KB
Expansion	:	3 X EISA Slots, 2 x PCI Slots, 1 Shared EISA/PCI
Hard Disk Drive	:	2 GB SCSI
Floppy Drive	:	1.44 MB
CD ROM Drive	:	QUAD Speed SCSI CD ROM Drive
External Ports	:	1 Enhanced Parallel (ECP/EPP) 2 High Speed 16550 Compatible Serial Ports 1 Graphics 1 Keyboard 1 Mouse 1 SCSI-2 50-Pin External 2 Ethernet Ports (10 Base T, 10 Base 2)
Other Standard Features	:	Flash BIOS 2 Low Noise Variable Speed Fans Easy Access, No Screws Enclosure Rack Mountable
Integrated Controllers	:	PCI Enhanced IDE (4 Devices) PCI Fast SCSI 2 (Narrow) PCI Full Duplex Ethernet Controller
Bays	:	1 3.5" Front Accessible 3 5.25" Front Accessible 2 3.5" Full Height
Network Management Software	:	a) Server Works to Manage the Network b) Server Works Quick Launch

Looking for a desktop PC that delivers great performance at the best possible price? Then the

Venturis™ FX PCs are for you. With EDO memory, pipeline-burst secondary cache, 64-bit

graphics acceleration and single-socket memory upgradability, the

Venturis FX PC offers the best price/performance

going. Add unmatched system reliability

and ease-of-use features and you

have a very powerful, expandable

desktop PC.

- Choice of 100MHz, 120MHz, 133MHz, 150MHz and 166MHz Pentium® processors in a new, modern, frost-white enclosures.
- SiS chipset with single-socket memory upgrade path, PIO Mode 4 E-IDE hard disk drive support, and advanced power management.
- S3™ Trio 64V+ graphics for high performance, capability for enhanced MPEG and live video capture.
- Unique design of slide-in/out motherboard and easy-access, tool-less enclosure.

digital
PC



The best price/performance desktop delivering unmatched

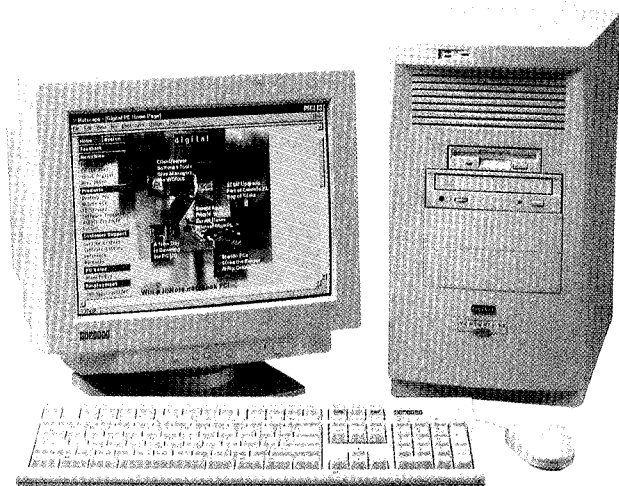
Venturis FX PC is where low price meets high performance

About the technology:

- Chipset: SiS 5511/5512/5513 allows the use of either EDO or Fast Page memory and provides single SIMM socket upgrade path. Also PIO Mode 4 E-IDE hard disk drive support.
- Memory: EDO memory provides significant performance increase over Fast Page memory and even greater performance increases with pipeline-burst secondary cache.
- Processors: Full range of Pentium processors from 100MHz to 166MHz.
- Graphics: S3 Trio 64V+ offers great performance through faster memory addressing and a fast graphics engine. It also provides optional MPEG and live video playback.

About the quality and reliability:

- Venturis FX is manufactured to the industry's highest standards of excellence at our automated build-to-order, ISO9002 manufacturing plants.
- Initial reliability testing is done at all manufacturing plants. Reliability testing processes include network, operating system, application, options and regulatory compatibility.
- Venturis FX is certified for most of the major operating systems and network operating systems.
- Venturis FX is tested to meet most Worldwide regulatory approvals and many voluntary and government-mandated environmental approvals.



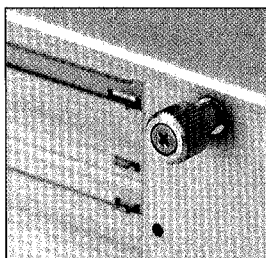
Which configuration do you need?

CONFIGURATION CHART		
	Standard	Multimedia
Enclosure	Full Profile, Short Tower	Short Tower
CPU	P54C-100/120 133/150/166	P45C-100/133/166
Memory	EDO	EDO
SIMM Sockets	6	6
Graphics	Trio 64V+	Trio 64V+
Graphics Memory	1MB EDO Upgrade to 2MB	2MB EDO
Serial Ports	2	2
Parallel Ports	ECP/EPP 2 Channel DMA	ECP/EPP 2 Channel DMA
Audio	None	On-board
Cache	256KB standard 512KB optional	256KB standard 512KB optional
MPEG	H/W MPEG (Option upgrade)	H/W MPEG (Option upgrade)

d reliability and ease of use.
ance, whatever your business needs.

Ease that extends to system service and maintenance.

We've done everything we can to make Venturis FX the easiest, most affordable, simplest-to-deploy system you've ever seen. Here are just three examples.

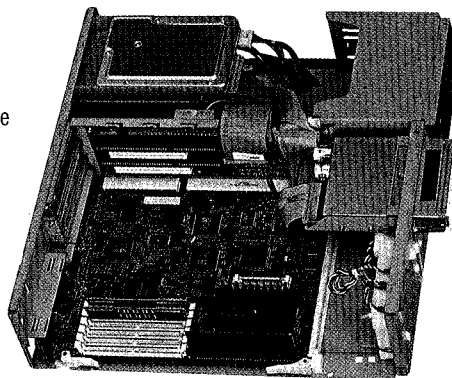


Exclusive, easy-access enclosure

New tool-less enclosure cover lets you get inside Venturis FX with one single thumb screw on the low profile, and three on the short tower model. Thumbscrew remains in place on the enclosure when you remove the cover. Cover is quickly and easily removed and replaced, with no bendable metal or plastic "grabs" to fool around with. A fixed riser card backplane contains all interconnects: motherboard, storage, power. Neat, all-in-one-place cabling reduces internal clutter. All cables are on the riser card.

Intelligent motherboard design

New motherboard design entirely eliminates mounting screws. Motherboard slides in and out on rails and connects to the backplane with a single connection. No option card or internal cable removal is required to upgrade the motherboard. All commonly upgraded components are at the front of the motherboard to simplify upgrades even when additional option cards are installed. Jumper settings are all in one place, and are described on a label inside the enclosure.



ClientWORKS™

Digital's ClientWORKS offers unique capabilities in the industry and provides many benefits including:

- Powerful remote management, configuration and diagnostics to reduce travel costs, improve accuracy of analysis, and improve response time and therefore improving end-user satisfaction.
- ClientWORKS is an industry-standard solution that provides MIS with consistent API's, that provides a standard set of information across desktops and that simplifies administration in a heterogenous PC environment.

digital
PC

Features

MODEL/PROCESSOR/SPEED - FXsm

Venturis™ FX 5100sm
100MHz Pentium® processor
Venturis FX 5133sm
133MHz Pentium processor
Venturis FX 5166sm
166MHz Pentium processor

MODEL/PROCESSOR/SPEED - FX, FXs

Venturis FX 5100
100MHz Pentium processor
Venturis FX 5100s
100MHz Pentium processor
Venturis FX 5120
120MHz Pentium processor
Venturis FX 5133
133MHz Pentium processor
Venturis FX 5133s
133MHz Pentium processor
Venturis FX 5150
150MHz Pentium processor
Venturis FX 5166
166MHz Pentium processor
Venturis FX 5166s
166MHz Pentium processor

SYSTEM MEMORY

8/16MB to 192MB EDO memory

CACHE MEMORY

16KB primary cache
256KB pipeline-burst secondary cache standard
512KB pipeline-burst secondary cache optional

GRAPHICS

Integrated S3™ Trio 64V+ graphics accelerator with 2MB EDO graphics memory standard (FXsm) or 1MB EDO graphics memory upgradable to 2MB (FX, FXs)

SLOTS

Low-profile: 3 total: 1 PCI full-length
1 PCI/ISA half-length/full-length
1 ISA half-length
Short-tower: 5 total: 1 PCI half-length
1 PCI/ISA full-length
3 ISA full-length

BAYS

Low-profile
4 total: 1 3.5" front-accessible slim-height (1.44MB diskette drive installed)
2 5.25" front-accessible half-height
1 3.5" internal slim-height
Short-tower
6 total: 1 3.5" front-accessible slim-height (1.44MB diskette drive installed)
3 5.25" front-accessible half-height
2 3.5" internal slim-height

EXTERNAL PORTS

1 enhanced parallel (ECP/EPP),
2 high-speed 16550-compatible serial,
1 graphics, 1 keyboard, 1 mouse

POWER SUPPLY

Low-profile: 100 watts, 110/120V switch selectable
Short-tower: 200 watts, 110/120V switch selectable

SOFTWARE PREINSTALLED

MS-DOS® 6.22 and Windows® for Workgroups™ 3.11 or Windows 95 (customer must select Windows for Workgroups or Windows 95 on power up)
On-line "Getting Started" user interface
On-line "Using Your Computer"
On-line documentation (MS-DOS, WFW)
ClientWORKS™ 2.2 with Desktop Management Interface (DMI)
Plug and Play utility (Windows 95)
Digital's Easy Network Setup
Netscape Navigator
MS Internet Browser
AMI Diag™
Adobe Acrobat Reader
Advanced Power Management setup
Diskette backup utility

DIMENSIONS

Low-profile
Height: 4.2"
Width: 16.5"
Depth: 17.75"
Short-tower
Height: 16.0"
Width: 8.5"
Depth: 17.5"

MULTIMEDIA FEATURES (FXsm ONLY)

Integrated 6x E-IDE CD-ROM
Integrated ESS™ 1788 audio
Integrated Spatializer 3-D™ Surround Sound
Headset
Microphone

OTHER STANDARD FEATURES

Plug and Play BIOS
PIO Mode 4 disk support
Color-coded I/O ports
Single-thumbscrew enclosure (low-profile)
Three-thumbscrew enclosure (short-tower)
Keyboard
Mouse

MULTILEVEL SECURITY

Power-on, user, administrator, keyboard and mouse passwords
Setup password
BIOS customization utility
Security hasp
Diskette drive boot control
Diskette drive write control
Hard disk drive control
Parallel/serial port interface control

CERTIFICATIONS

EMI/safety: FCC-B, UL, CISPR-22 (class B), VDE-0871-class B, Energy Star, VCCI-2, CSA, TUV, CE Mark, Korean EMI, N-Mark (NEMKO), D-Mark (DEMKO), S-Mark (SEMKO), FIMKO (SETI) and CB (Czech)
Software: Microsoft® Windows® for Workgroups™ 3.11; MS-DOS® 6.22; Windows 95; Windows 3.1; IBM OS/2® 2.x and 3.0; SCO® UNIX® 3.2.4 (client only); Windows NT™ Workstation™ 3.5 and 3.5.1; MS-DOS 5.0; Digital PATHWORKS™ 5.0; Novell® NetWare™ 386 3.11, 4.0 (client only)

WARRANTY

Three-year limited warranty

Options

PROCESSOR UPGRADES

Zero-Insertion-Force (ZIF) processor socket 7, upgradable to future Pentium processor technology

SYSTEM MEMORY

4, 8, 16 and 32MB EDO or Fast Page SIMM upgrade kits

GRAPHICS MEMORY (FX, FXs ONLY)

1MB EDO graphics memory upgrade

DISKETTE DRIVES

3.5": 1.44MB, 2.88MB

HARD DISK DRIVES

IDE: 845MB, 1.6GB; 2.5GB; SCSI*: 1.0GB, 2.0GB

CD-ROM DRIVES (FX, FXs ONLY)

5.25" SCSI; 5.25" 4x, 6x E-IDE

SCSI HOST ADAPTERS

Adaptec AHA-2940 PCI SCSI host adapter
Adaptec AHA-1540CP PnP ISA SCSI host adapter

TAPE DRIVES

E-IDE: 2.0/4.0GB; SCSI*: 2.0/4.0GB, 4.0/8.0GB

MONITORS

SVGA NI multimode color: 15" (13.6V)
SVGA NI auto-sync color: 14" (13.4V), 15" (14.0V), 17" (16.2V)
1280 x 1024 SVGA NI auto-sync color: 17" (16.0V), 21" (19.6V)

OTHER

Many other high-quality options are available for your Digital system. Consult your Digital Reseller for full details

*SCSI adapter required for SCSI options.

<http://www.pc.digital.com>

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Microsoft
Windows 95

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PC

Specifications for PC - VenturisFX/FXe

Processor	:	Intel, Pentium
Clock Speed	:	100MHz
Memory	:	16 MB EDO RAM
Cache	:	256 KB Pipeline Borst Cache
Monitor	:	14" SVGA Color Monitor
Graphics Accelerator Card	:	Integrated S3 Trio 64 Graphics
Video Memory	:	1 MB EDO Graphics Memory
Expansion	:	1 X ISA Slots, 2 X PCI Slots
Hard Disk Drive	:	1 X 1.2 GB HDD IDK
Floppy Drive	:	1 X 1.44 MB
Ethernet Card	:	1 X PCI 32 Bit E/Net Card
External Ports	:	1 Enhanced Parallel (ECP/EPP) 2 High Speed 16550 Compatible Serial 1 Graphics 1 Keyboard 1 Mouse
Upgrades	:	Zero-Insertion-Force (ZIF) Processor Socket 7, Upgradable to Future Pentium Processor Technology
Other Standard Features	:	Plug and Play BIOS PIO Mode 4 Disk Support Color Coded I/O Ports Three Thumbscrew Enclosure (Short-Tower) Keyboard Mouse
Multilevel Security	:	Power-on, User, Administrator, Keyboard and Mouse Passwords BIOS Customisation Utility Security HASP Diskette Drive Boot Control Diskette Drive Write Control Hard Disk Drive Control Parallel/Serial Interface Control
Software Pre-Installed	:	Plug and Play Utility (WFW) Microsoft's Internet Browser ADOBE Acrobat Reader AMIDIAG Advanced Power Management Setup
Software	:	Windows 95

digital

AlphaStation 255 workstations

The price/performance leaders in 64-bit RISC computing

ALPHA™

GENERATION

Providing superior application and graphics performance at affordable prices, the AlphaStation 255 is the ideal open system for today's most popular applications.

- Investment protection with a single chip replacement when you move from 233 MHz to 300 MHz, plus future in-cabinet upgrade to faster processors
- Built-in energy conservation features*

At a glance

AlphaStation 255 systems offer:

- Best applications — MCAD/ECAD, CASE, software development, graphics information systems, imaging, financial modeling, and desktop publishing
- A choice — Meet your performance needs with either the 233 MHz or 300 MHz model.
- PCI-based performance for fast bus and I/O path
- Support for Digital UNIX®, OpenVMS Alpha, and Windows NT™ Workstation operating systems
- Complete range of graphics accelerators
- Out-of-the-box multimedia

Best value, the 255/233 Best performance, the 255/300

With the quickest processor technology around, the AlphaStation 255 systems offer the highest performance in their price range. Two AlphaStation 255 models, the 255/233 and the 255/300 systems, let you choose the speed best for your work for the price you want to pay.

Choose from over 6,000 applications

You'll find what you need to do your work, from the most sophisticated CASE and software development applications to graphics-intensive desktop publishing, to performance-intensive applications for mechanical or electronic computer-aided design, mapping, and imaging.

*Screen image courtesy of Interleaf.
Background image courtesy of
Parametric Technology Corporation.*

*Requires Digital UNIX V4.0



Purchase your options

Peripheral Component Interconnect (PCI) works as a processor-independent bridge between the CPU and high-speed peripherals to provide a high-performance local bus. The openness of the PCI bus ensures reliability between components, add-in cards, and systems. That means greater performance and flexibility to purchase options with the best configurations and pricing.

PowerStorm graphics and multimedia

The PowerStorm family of scalable graphics, driven by the AlphaStation 255 workstation, delivers leadership price/performance.

All PowerStorm graphics provide 3D functions with an industry-standard OpenGL® interface. With the PowerStorm high-performance 4D series, you get incredible realism and motion via hardware-accelerated OpenGL.

And the built-in PowerStorm multimedia lets you play and edit video and audio, and collaborate with your colleagues.

Work as a team

Included with the AlphaStation 255 systems is Communique!™ Starter, software that enables you to optimize your productivity and fosters innovation through use of separate modules such as Shared Whiteboard, Chart Tool, Conference Manager, and Business Card Editor.

Protect your investment

The AlphaStation 255 systems follow the rules of business economics. When you're ready to improve performance, you replace a chip to move from the 233 MHz to the 300 MHz

Specifications		
CPU	255/233	255/300
Clock speed	233 MHz	300 MHz
Cache size on chip	16 KB I-cache, 16 KB D-cache	
Cache size on board	1 MB	1 MB
Performance		
SPECint95*	3.80	4.51
SPECfp95*	5.09	5.71
SPECint92*	180	215
SPECfp92*	210	245
Xmark93*		
(PowerStorm 3D30 graphics)	17.78	19.94
LINPACK 100 × 100		
DP MFLOPS*	46.5	53.3
I/O		
Max. memory	512 MB	512 MB
Max. storage, internal	6.4 GB	6.4 GB
Drive bays	4 storage bays; one for optional 1.44 MB diskette drive; two 3.5-inch bays for fixed disk options; one 5.25-inch bay for half-height CD-ROM	
Max. I/O throughput	PCI: 132 MB/s	
Storage I/O	2 PCI slots, 1 ISA slot, 1 PCI/ISA slot; two serial ports, one enhanced bidirectional parallel port; fast SCSI-2	
Optional I/O support	Fast Ethernet, FDDI, Token Ring	
Network support	Integrated 10-BaseT	
Operating systems	Digital UNIX, OpenVMS Alpha, Microsoft® Windows NT Workstation	
Graphics and multimedia	PowerStorm 3D10, 3D30, 4D20, ZLXp-L1, ZLXp-L2	PowerStorm 3D30, 4D20, ZLXp-L1, ZLXp-L2, Freedom Series™
Video	FullVideo Basic	
Audio	Built-in CD quality audio, headphone, microphone	
Collaborative computing	Communique! Starter (Digital UNIX, Windows NT Workstation)	

All 255 systems

Operating environment	
Operating temperature	10°C to 40°C (50°F to 104°F)
Storage temperature	-40°C to 66°C (-40°F to 151°F)
Operating humidity	10% to 90%, maximum wet bulb 28°C (82°F)
Storage humidity	10% to 90%, maximum wet bulb 46°C (114°F)
Operating altitude	3,048 m (10,000 ft) maximum
Nonoperating altitude	12,192 m (40,000 ft) maximum
Operating vibration (sine)	5-10 Hz @ 0.02-inch DA; 10-500 Hz @ 0.1 G peak
Nonoperating vibration (packaged random)	1.03 GRMS from 5 to 300 Hz +8 dB/octave 5 to 10 Hz -8 dB/octave 50 to 300 Hz
Operating shock (half sine)	10 G peak, 10 ms (+/- 3 ms) duration
Nonoperating shock (packaged drop)	18-inch drop all sides
Power requirements	
Line voltage	120 V/240 V
Voltage tolerance	90-128 V/190-256 V
Frequency single phase	50 Hz/60 Hz
Frequency tolerance	47-63 Hz
Max. running current	7 A/3.3 A with monitor, 4 A/2 A without monitor
Max. power consumption	200 W
Physical characteristics	
Desktop system	Height: 13 cm (5.12 in) Width: 44.6 cm (17.56 in) Length: 48.4 cm (19.06 in) Weight: 16 kg (35 lb)

*Estimated

processor. It's as simple as that. Plus, there will be future in-cabinet upgrades to even higher performance processors.

Service you expect

Digital includes a three-year hardware warranty, one-year on-site service, and 90 days of software advisory telephone support. Second- and third-year repair service is offered through carry-in to a Digital SERVICenter or by mailback to Digital. A full range of consultation and services, training, and software support are also available through Digital. You tailor the support to meet your needs.

For more information

To learn more about the AlphaStation 255 64-bit RISC workstations, contact your local Digital sales office or Authorized Digital Business Partner. Call 1-800-DIGITAL (via touchtone phone in the U.S. or Canada), or 1-908-885-6426 (outside the U.S. and Canada). Send e-mail to: info@digital.com, or on the World Wide Web, reach us at <http://www.alphastation.digital.com>.

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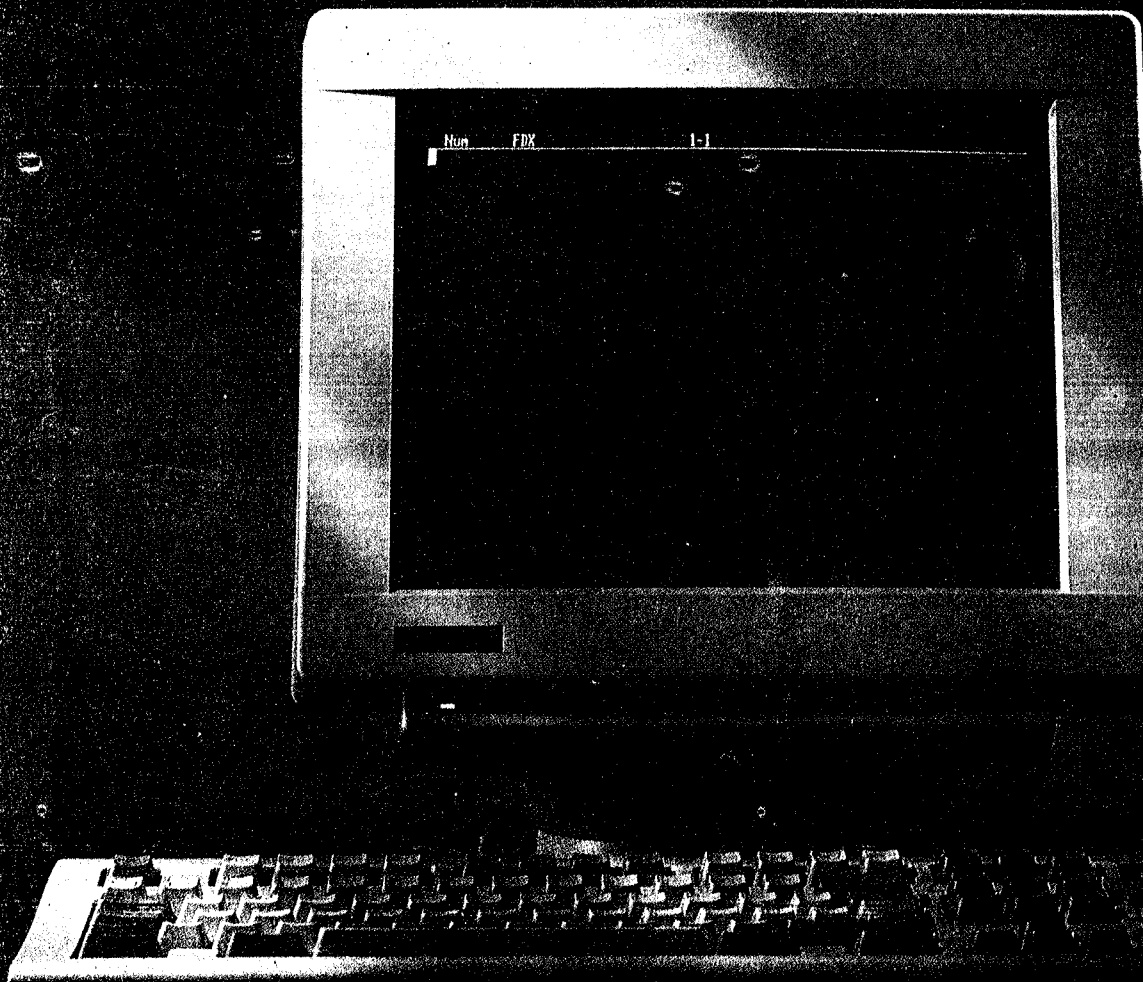
VM23XX Family of Terminals

- High quality display with 62 Hz refresh
- Faster Communication speed (76.8 baud)
- 6 Popular Emulations for networked UNIX
- Stylish and ergonomical design
- Meets Stringent quality requirements
- Fully Programmable function keys with EEPROM save
- Switch mode Power Supply 90V to 264V
- Basic RS232 protection to reduce port failures
- Scores of other useful features like elapsed clock, definable Status line, Banner message
- Global port for spooler printing
- Assured long term spares support

Models VM 2310 : Customised DEC VT220 for UNIX

VM 2310G : VM2310 + Graphics

VM2320 : DEC VT220 Compatible



DISPLAYS WITH A DISTINCT DIFFERENCE



digital

Networks

DEChub 900 MultiSwitch enterprise chassis

Delivers unmatched flexibility in configuring and growing your networks

The only enterprise hub designed for change! With

computer networks today, the only constant is change.

Technologies change. Users require change. Locations

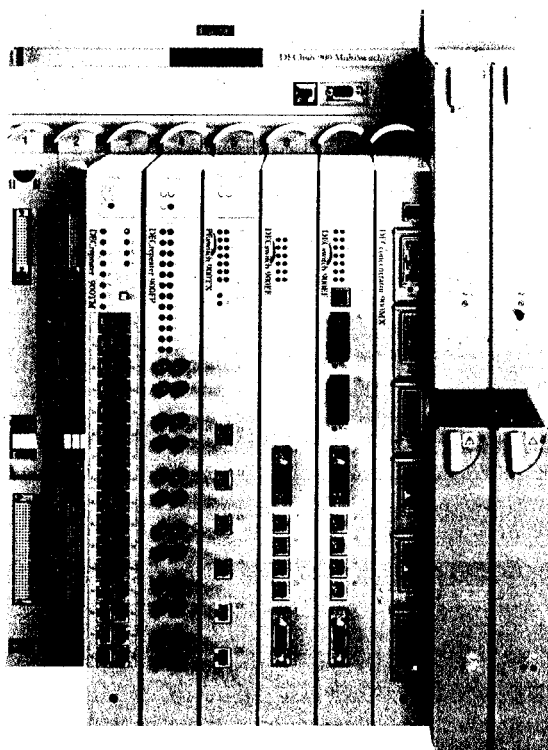
change. As the cornerstone of all networks, your enterprise

chassis must be able to keep pace with these rapid changes.

The DEChub 900 MultiSwitch enterprise chassis is the only enterprise chassis exclusively designed to help you cope with change. Its backplane is technology-independent, so it's capable of supporting any LAN or interconnect technology — without requiring an upgrade. It takes a simple click of a mouse to reconfigure your network or to create virtual LANs. Simply put, the DEChub 900 MultiSwitch lets you stay on top of virtually any change that might come along.

Benefits

- Provides a built-in growth path — accommodates virtually any technology, even emerging high-performance technologies such as ATM — without additional hardware or expensive upgrades
- Creates a single point of integration for multiple LAN technologies and WAN connectivity
- Lets you aggregate users, create LAN segments, and simplify network moves, adds, and changes — with the click of a mouse
- Implements virtual LANs across multihub building backbones — today
- Minimizes training and support costs through plug-and-play operation and simple-to-use *clearVISN* management software
- Protects your investment by accommodating all Digital 90-series modules without modification



en **VISN**

✓ *Digital's Networking Architecture*

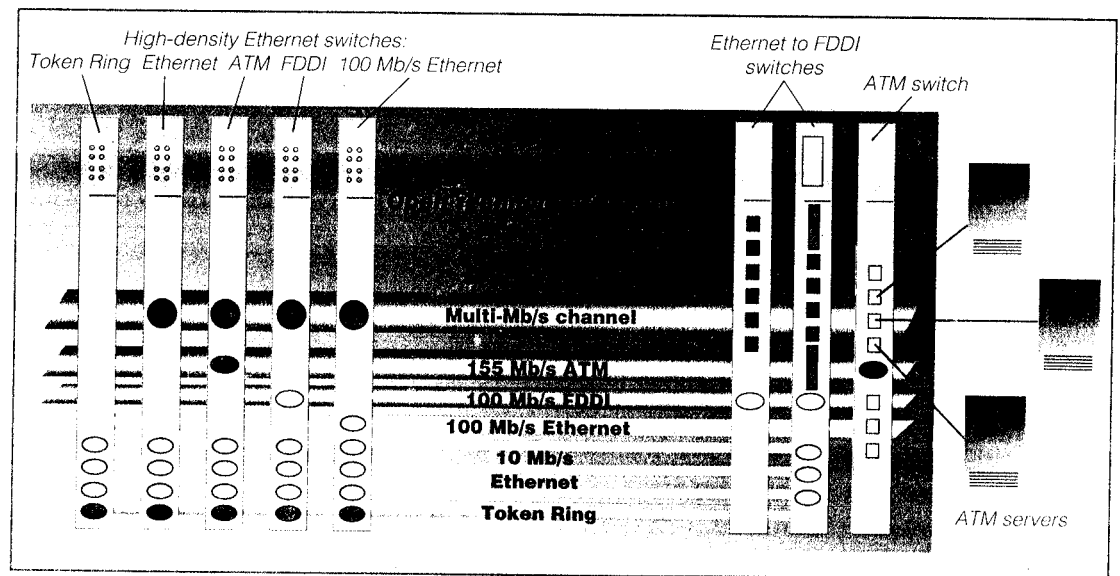
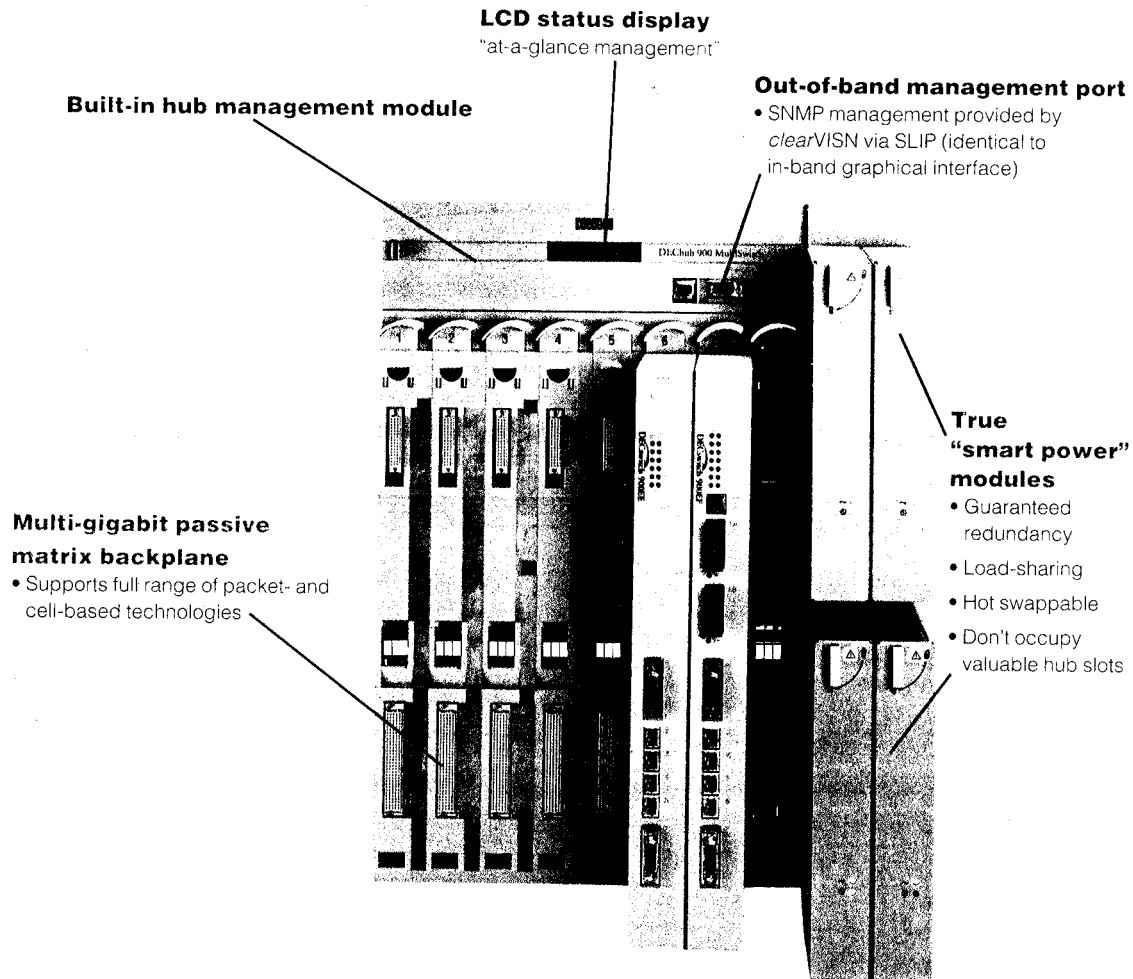
DEChub 900 MultiSwitch: The inside story

Digital's DEChub 900 MultiSwitch enterprise chassis is a multitechnology, latest-generation hub designed to support large, complex networks — ranging from simple LAN connectivity to high-speed switching. It offers high-performance access, configuration flexibility, and superior security and network management.

The DEChub 900 MultiSwitch lets you integrate all of your networking requirements on a single platform. You can easily assign and reassign bandwidth wherever and whenever you need to — no matter what LAN technology is required.

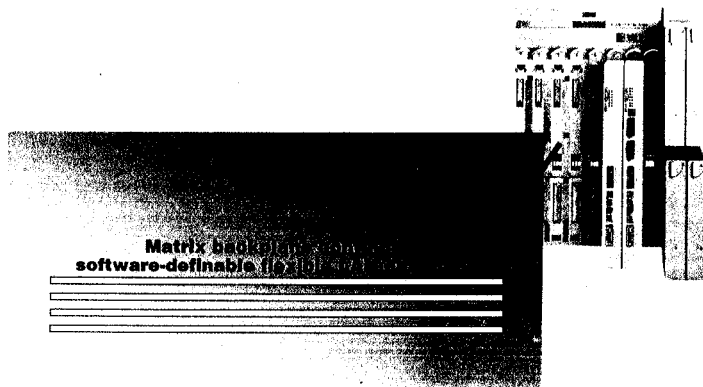
Ready for the future

The DEChub 900 MultiSwitch is more than prepared to meet future challenges head-on. Its unique multi-gigabit, software-definable, passive-matrix backplane architecture is designed to support all current and future packet- and cell-based technologies — including Ethernet, Token Ring, FDDI, Fast Ethernet, and ATM. All this and more with a simple firmware upgrade, not hardware obsolescence!

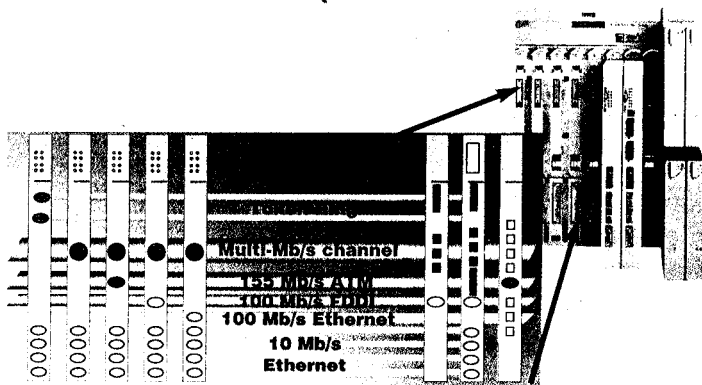


A software-defined chassis — supporting multihub VLANs

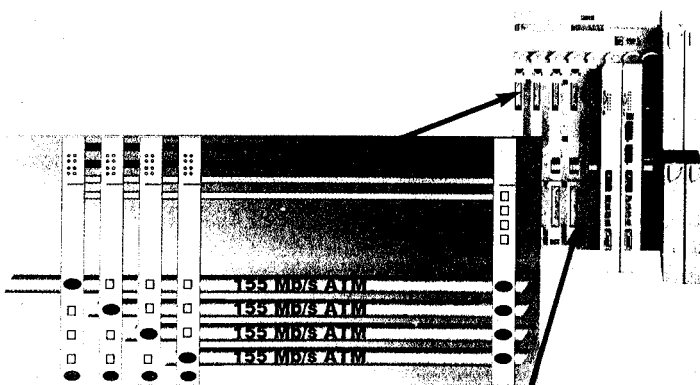
clearVISN



DEChub 900 MultiSwitch backplanes



Example of DEChub MultiSwitch backplane software-configured to support multiple LAN technologies



Example of DEChub MultiSwitch backplane software-configured for ATM

Simple, low-cost network management

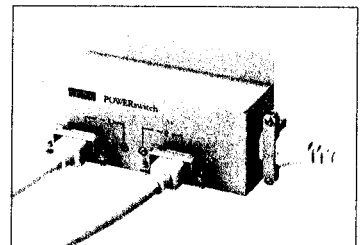
The DEChub 900 has a built-in, no-extra-cost Simple Network Management Protocol (SNMP) hub management agent. This hub agent is specifically designed to manage multislot chassis functions, such as create and delete LAN types, allocate bandwidth, and configure modules onto the backplane. Each DEChub 900 single-slot module has its own integral, no-extra-cost SNMP agent to collect and report management

data. This integral agent design, combined with *clearVISN*, Digital's policy-based management software, provides full SNMP management without sacrificing valuable hub slots or budgeting for additional add-on management modules.

clearVISN provides the same easy-to-use, graphical interface for both in-band and out-of-band management to let you instantly switch traffic, reconfigure LAN segments, and manage your hubs with a click of a mouse.

POWERswitch — the easy way to provide redundant AC power

The **POWERswitch** is a standalone optional device that can be easily attached to the **DEChub 900** chassis to provide redundant AC.



The **POWERswitch**:

- Guards against network downtime due to loss of AC power
- Provides two independent AC power sources for a wide variety of networking devices
- Senses loss of AC power from the primary source and automatically switches to the backup AC power source

Indicator lights on the outside of the **POWERswitch** show the presence of a primary power source, an auxiliary power source, and AC power. If the primary power source fails, the **POWERswitch** will switch to auxiliary power within 20 milliseconds — so no network connection is lost. When the primary power returns, the **POWERswitch** automatically switches back to the primary source, again within 20 milliseconds.



Simplifies configuration and installation

The DEChub 900 MultiSwitch multislot hub chassis provides configuration and installation flexibility. With no slot restrictions or dependencies for up to eight DEChub 90/900 modules, it's easy to configure the system to meet any LAN requirement.

Accommodates DEChub 90 family modules

The half-height, single-slot hubs of the DEChub 90 family are fully functional in the DEChub 900. This lets you scale small LANs upward in stages. Now that's investment protection!

Provides power redundancy and hot-swapping

You can add up to four power supply units as the hub system grows — thereby supporting any configuration with redundancy. This lets your hub continue to operate even if one power supply units fails.

If a unit should fail, hot-swapping allows for quick removal and installation of a new power supply unit — without powering down the hub.

Specifications

Chassis

Height	57.8 cm (22.75 in)
Width	44.5 cm (17.5 in)
Depth, chassis only	5.1 cm (2.0 in)
Depth, power supply	21.6 cm (8.5 in) module only
Depth, full-height	15.2 cm (6.0 in) network module only
Depth, half-height	11.2 cm (4.4 in) network module only
Operating temperature	5°C to 50°C (41°F to 122°F)
Humidity	10% to 95% non-condensing
Chassis with rack/wall	14.4 kg (32 lb) mounting brackets
Power supply	2.25 kg (5 lb)
Half-height network	0.68 kg (1.5 lb) typical group module
Full-height network	1.8 kg (4.0 lb) module

Rack mount option

Mounting area

Height	57.8 cm (22.75 in)
Width	45.0 cm (17.71 in)
Depth	31.8 cm (12.5 in)

Required clearance

Bottom	7.7 cm (3 in)
Top, sides, rear	None
Front	As required for attached cabling

Wall mount option

Mounting area

Height	57.8 cm (22.75 in)
Width	44.5 cm (17.5 in)

Required clearance

Top and bottom	7.7 cm (3 in)
Sides	2.54 cm (1 in)
Depth from wall	1.8 cm (12.5 in)

Electrical

Input voltage	88 to 264 V auto-ranging
AC line frequency	50 Hz to 60 Hz
Input current	Less than 10 A
Maximum heat dissipation	730 W
Maximum input power consumption	1,000 VA

Ordering information

Digital part number	Description
DMHUB-##	DEChub 900 MultiSwitch 8-slot Intelligent Hub Chassis (includes one power supply)
H7894-MA	DEChub 900 redundant power supply units
H7661-AA	POWERswitch

Note: ## should be replaced by the following letters to ensure that the appropriate country kit is ordered. AA = U.S., Canada, and Japan; AC = Denmark; AE = United Kingdom; AI = Italy; AK = Switzerland; AT = Israel; AX = Central Europe; AZ = Australia; BJ = India and South Africa

Worldwide service and support

Digital's DEChub 900 MultiSwitch product is covered by a one-year return-to-Digital warranty. For additional related services, contact your local Digital Multivendor Customer Services organization or authorized reseller.

Call us

To learn more about the DEChub 900 MultiSwitch enterprise hub chassis, or any of Digital's products or services, or for the name of the Digital reseller nearest you, call 800-457-8211 throughout North America; worldwide call the U.S. at +1 508-692-2562. Information is also available on the World Wide Web:

U.S.

<http://www.networks.digital.com>

Europe

<http://www.networks.europe.digital.com>

Australia

<http://www.digital.com.au/networks>

Japan

<http://www.dec-j.co.jp/ic/network>

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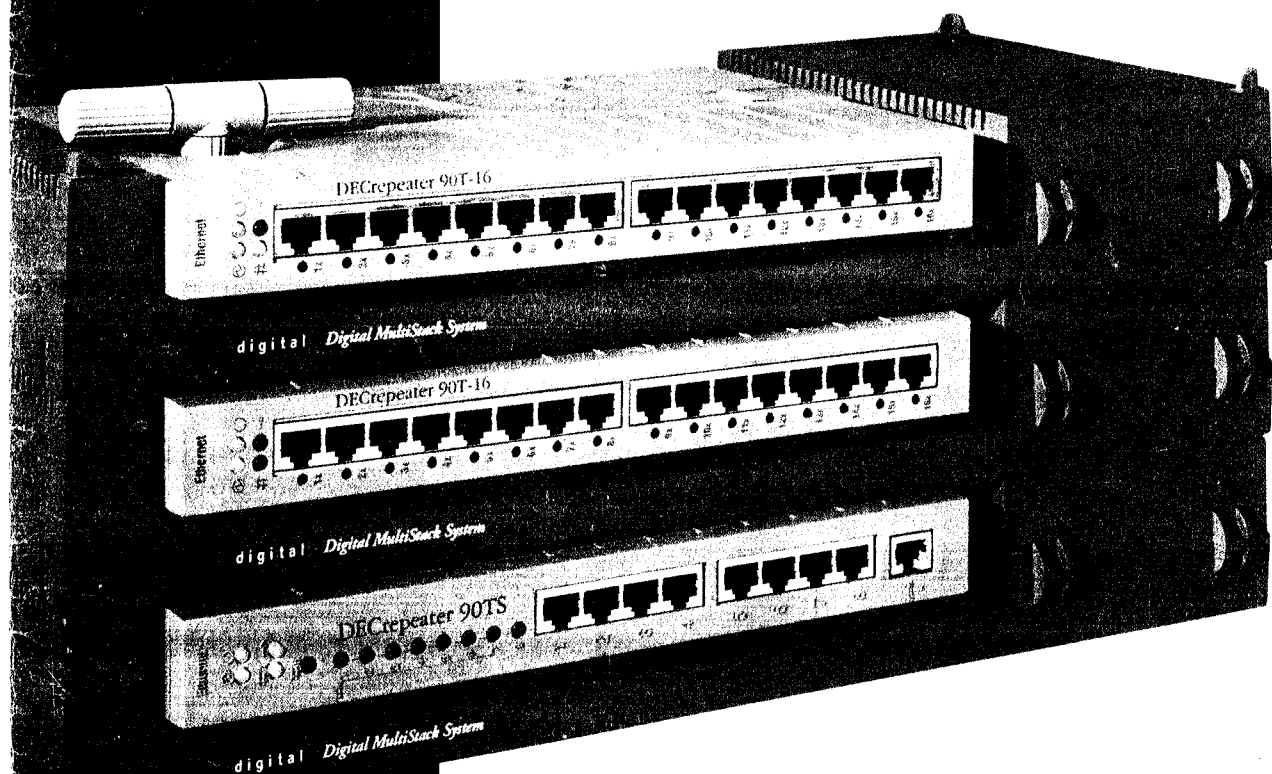
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Digital Knows Networks

digital

Networks

Digital MultiStack System



**Low-cost stackable hubs —
from basic workgroup connectivity to
switched enterprise networking**

en **VISN**

An easy start with sky's-the-limit potential

Communicating. Accessing the Internet. Staying in the loop, while on the road.

Gaining the freedom of mobility, without missing a beat.

Whether you're a start-up operation, a school, a branch facility, or an international industrial giant, networks are fundamental to your organization. Yet, networking needs vary widely. And with organizational flexibility and mobility a given today, those needs will inevitably change — perhaps more quickly than you expect.

Digital has a networking solution that stacks up to whatever your organization demands — the Digital MultiStack System. Unlike any other stackable hub on the market, the Digital MultiStack System gives you all you ever wanted in a stackable hub — and more. You get unprecedented flexibility, versatility, and functionality, plus a lifetime warranty on 10BaseT repeaters. This is the best value in the industry, starting at the lowest price.

When it comes to value, nothing else stacks up to the Digital MultiStack System. Whatever your network media choices, configuration challenges, or functional requirements, the Digital MultiStack System delivers everything you need,

when you need it. From basic connectivity to switched enterprise networking, you can start small and grow at your own pace.

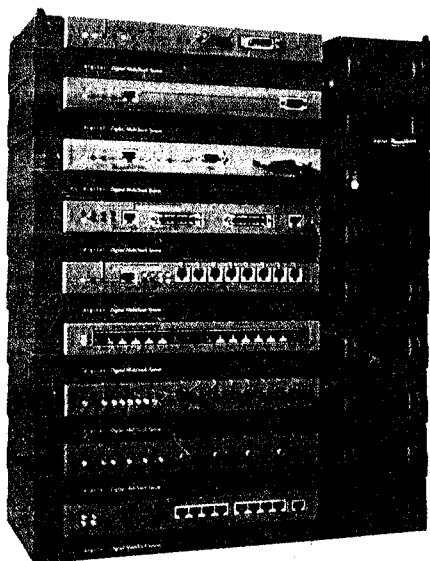
Building a small Ethernet workgroup? At less than \$50 per port, the DECRepeater 90T-16 is the perfect way to start out. Spanning a wide area or using Frame Relay services? Stack on a RouteAbout Access router. Need to connect wireless users to your LAN? The RoamAbout Access Point keeps them connected while they're on-the-go.

Start out with a single stackable hub and stack on connectivity, internetworking, remote access, monitoring, or management hubs as you need them — with the Digital MultiStack System, the sky's the limit!

Extending a lifeline to remote users who need access from their home offices? Plug in the Digital NetRider 90. Ready to increase network performance? Add a DECswitch 900 — done.

Stack 'em up, as you need 'em — it's never been easier and more cost-effective to design and build your network. That's because you buy only the functionality you need today — no big capital investments to worry about. And our stackable hubs stack up in seconds, so installation costs are minimal. What's more, with the range of functionality and configuration flexibility of the Digital MultiStack System, you can keep on growing.

Of course, as you grow, you'll need easy and affordable network management, too. Just stack on a Digital 90-series repeater manager or management agent. And from your first stackable hub to the top of the stack, you can manage and control all the ports in your network from a single management window using Digital's Windows™-based HUBwatch graphical management application. This easy-to-use, low-cost management tool runs on a standard PC or can be launched from other popular enterprise managers, such as HP's OpenView or Novell's NMS. That keeps your initial investment low, saves on training costs, and reduces ongoing operations costs for the life of your network.



Grow at your own pace — from the ground up

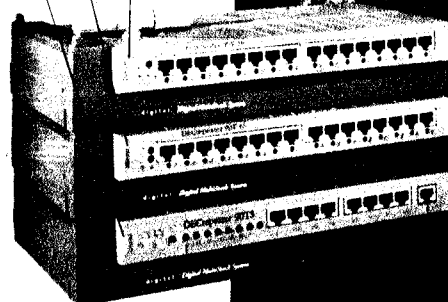
If the cost and complexity of building a network has you down, just stack it up! With the Digital MultiStack System, networking is a snap. And our low cost-per-port will have you smiling whether you're connecting 20 people or 200. With just a small stack of Digital hubs, teachers and students could get into some serious dialogue, debate, and collaboration. Stack on a few more internetworking hubs and give those students access to information at the local university library or the Library of Congress. Attorneys looking for a precedent-setting decision deep in their archives are just a stackable hub away. Business travelers in remote offices can dial-in to use the resources of their corporate network as though they were right there. The Digital MultiStack System includes everything you need to build a network, with a range of functionality you can just stack on as requirements dictate. So it's easy and affordable to get a "start-up" network for today that leaves you open to limitless possibilities as the future unfolds.

Digital NetRider 90 — a DECserver 90M with client software that enables dial-up network access for remote PCs

DECrepeater 90T-16 — low-cost SNMP manageable hub with 16 Ethernet 10BaseT ports

DECrepeater 90TS — low-cost, 8-port "intelligent" hub with built-in SNMP management

**The only risk-free
stackable — it's as
easy as multiple
choice**



Everything you need in a stackable hub — and more

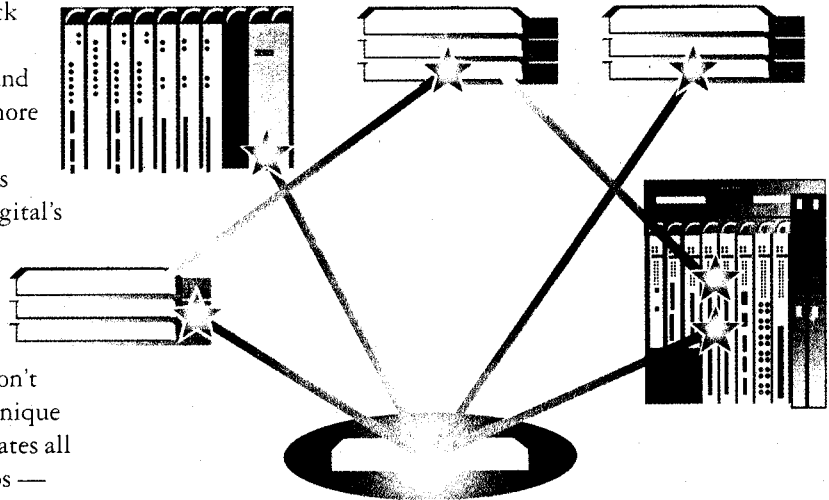
The Digital MultiStack System comes with everything you need — and it's never been easier or more affordable to build your network as you grow or as requirements change. Digital's stackable repeaters, bridges, and agents come complete and ready-to-use — just plug and play. But you don't have to stop there. Our unique stacking unit accommodates all of Digital's 90-series hubs — including access servers, bridges, routers, wireless hubs, and RMON probe. They just snap into the stacking unit. It literally takes seconds to add a module and your stackable hub is ready to go — so you never have to purchase more than you need.

Best of all, you can keep on growing and never worry about being stuck with your stacks. That's because the Digital MultiStack System gives you the ultimate in flexibility. If space is at a premium, these compact stackable hubs will fit your style. Put each hub wherever you want — a desk here,

a closet there. Stack up to 16 of them, either co-located or distributed up to 185 meters apart. And you never have to worry about downtime when adding or replacing a module. That's because the Digital MultiStack System lets you hot-swap hubs — it's the only one in the industry that can!

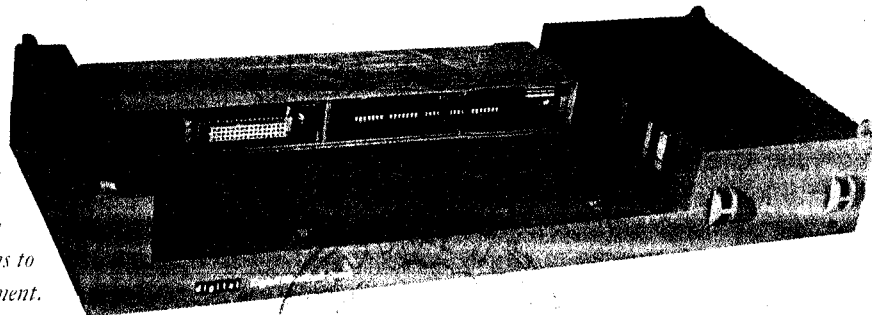
This flexibility keeps on working for you beyond the stack, too. Prefer a rack-mount solution? Digital stackable hubs go from the stack to a standard rack mount quickly and easily.

And moving to a chassis for a workgroup, department, or enterprise solution is a snap. Digital offers the only stackable hub in the industry that also fits into a DEChub 90 workgroup chassis or the DEChub 900 MultiSwitch multitechnology department/enterprise chassis — so you get scalable growth and investment protection. You won't find a more flexible, scalable, and affordable network solution anywhere else. This is a Digital exclusive.



The Digital MultiStack System stacking unit puts everything at your fingertips. The stacking unit includes connections to enable SNMP management. And you can even get an

optional AUI connection for the DECRepeater 90T-16 should you need an interface to a backbone network. Cables, connectors, and mounting brackets are all included and ready to go!



A stackable hub you can bank on

Branch facilities may have modest networking requirements within their own environments, but extensive needs to interface with corporate databases and staff. If you have business travelers or telecommuters, there's an even greater need to give these mobile/remote users ready access to all the information and communications they need to be effective in their jobs. Stack up our repeaters, routers, remote access servers, and wireless hubs as you need them. You've got a complete set of networking products to meet your needs — from local communications and data sharing, to interfacing with the corporate backbone, to giving remote users full access to file servers, databases, printers, e-mail, and other vital network resources. Best of all, an investment in the Digital MultiStack System is risk-free, since all our stackable hubs easily migrate to chassis configurations as your needs change. That's a solution you can bank on for the life of your network.

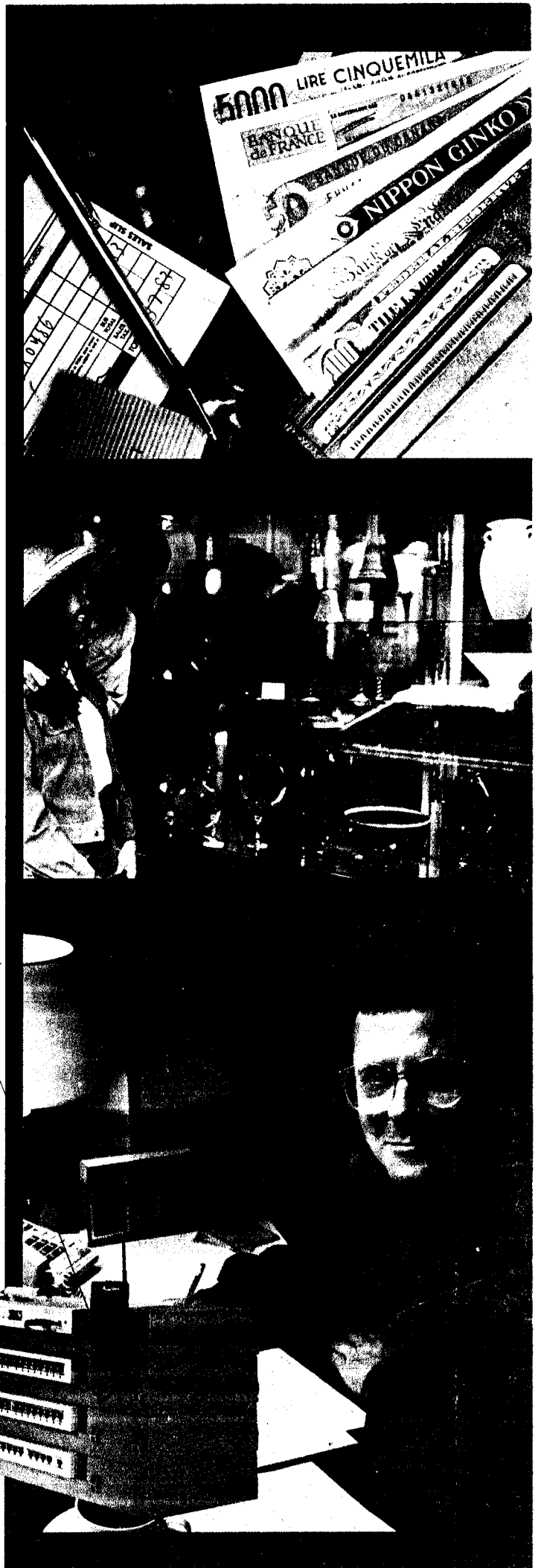
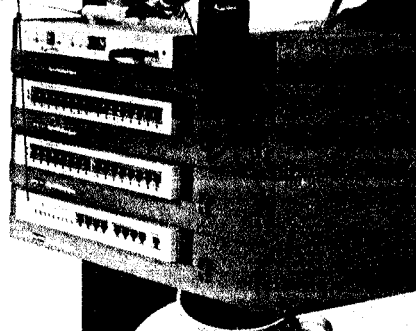
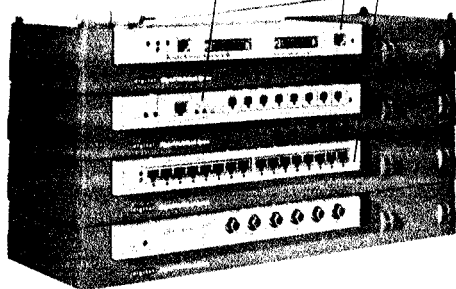
RoamAbout Access Point — wireless bridge to service desktop and roaming laptop users

DECrepeater 90TS — 8-port 10BaseT Ethernet connectivity with built-in SNMP management and security

DECrepeater 90T-16 — low-cost 16-port 10BaseT Ethernet hub managed by DECrepeater 90TS

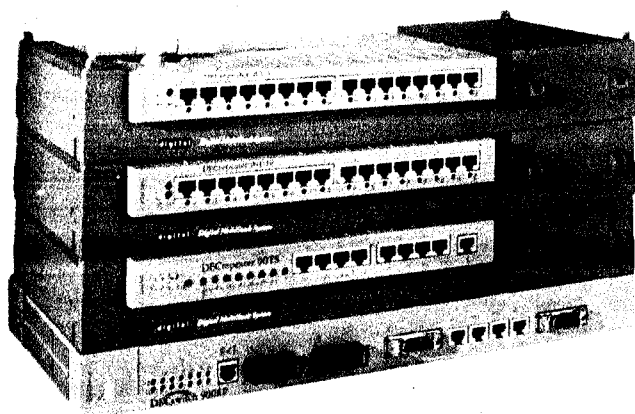
Digital RouteAbout Access EW Router — wide area connectivity to central site or the Internet

Digital NetRider 90 — dial-in network access for remote users, with support for all popular communications protocols



Get a lifetime of value from your network

There's no end to the number of ways the Digital MultiStack System can add value to your network. If you're a small enterprise, it's a very affordable starting point with "sky's-the-limit" potential. Mid-size organizations can stack up a complete, managed network; add wide area connectivity; and tie into the corporate backbone. Even for the largest business or institutional environments, Digital stackables add value and functionality. In fact, they could be a lifesaver for the network manager trying to add workgroups to an already saturated backbone.

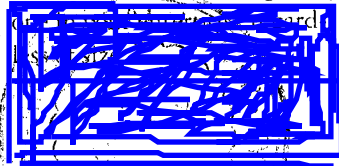


For increased bandwidth, low-cost networking, build a switched edge stack with Digital's DECswitches and the Digital MultiStack System. When you're ready to build secure workgroups, Digital switches are "router ready" so you can isolate traffic as needed. What's more, Digital's enVISA architecture provides for distributed routing across multiple switches, giving you a low-cost, high-performance entrée into the world of virtual networking. It's part of Digital's enVISA — and it's a reality today.

As networks expand out from their core, performance becomes a major issue. As workgroups are added to the edges of the network, they soak up precious bandwidth. The result can often mean network bottlenecks and poor response times as the limits of the backbone are tested. The solution is the "switched edge stack" — and Digital has it. A switched edge stack utilizes Digital hub-based switches to provide high-speed connectivity between the network backbone and the Digital MultiStack System. It's the perfect way to add bandwidth-hungry workgroups without diminishing performance.

Integrate the Digital MultiStack System with Digital's hub-based switches for increased network responsiveness and low-cost connections.

The fact is, with the Digital MultiStack System your investments just keep working for you. Digital's unique DEChub modularity is a key part of that growth ability. But Digital's end-to-end array of networking products also gives you the only fully integrated migration path to take your network wherever your business leads. From basic workgroup connectivity to high-speed, high-capacity networks — from Ethernet, to FDDI, to ATM — interconnecting every-



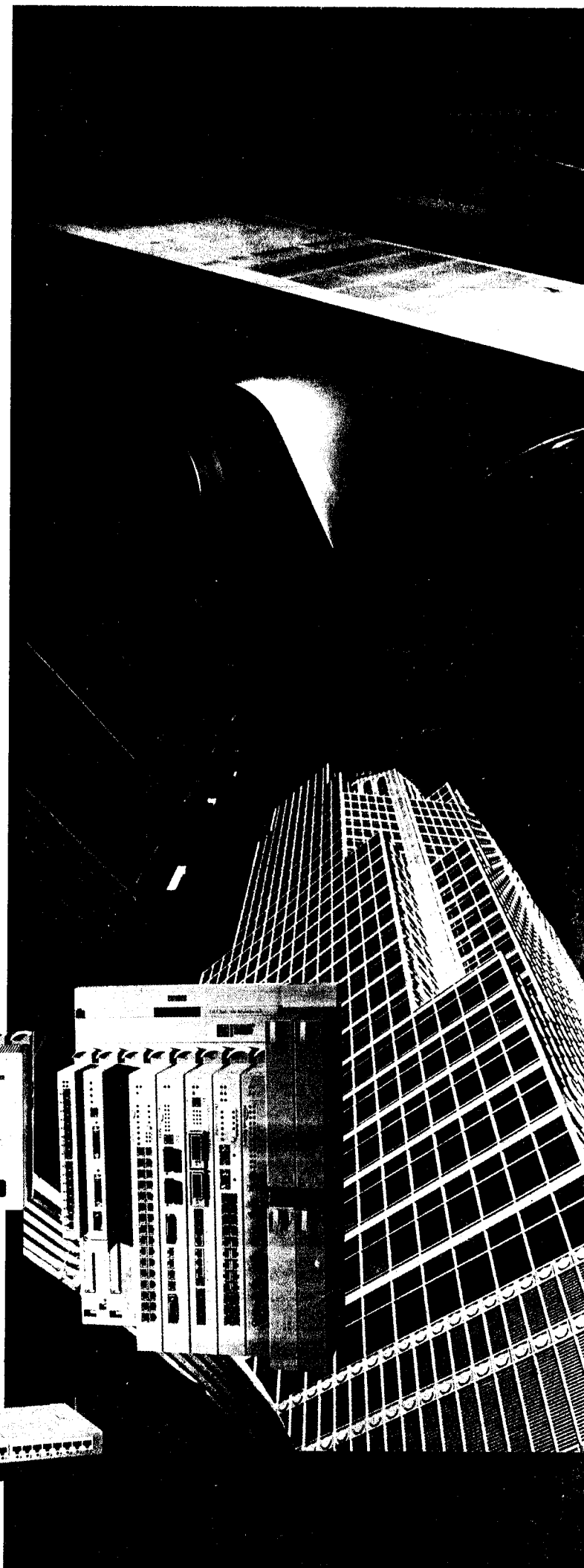
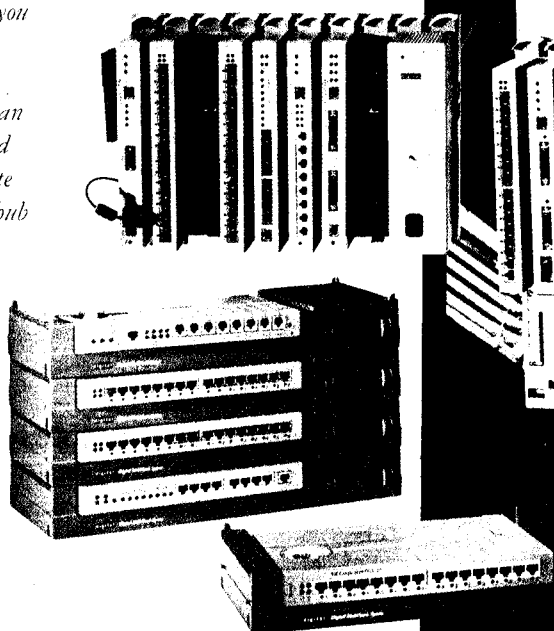
From a single stackable hub to the switched enterprise backbone, Digital gives you the tools to manage your network as it grows. To perform traffic monitoring, fault diagnosis, and network performance tuning, for instance, just stack on the DECpacketprobe 90 and use Digital's PROBEwatch for Windows — it's a comprehensive, easy-to-use, graphical LAN analysis tool. Want to configure, monitor, and control your network without ever leaving your PC? Digital's HUBwatch management application gives you the power to build and manage a low-cost repeater all the way up to FDDI and ATM backbone switches — all from a low-cost PC or workstation platform. Not only that, but you can launch the same low-cost Windows-based HUBwatch tool from enterprise management platforms such as HP OpenView, Novell NMS, SunNet Manager, POLYCENTER NetView, or Digital's ManageWORKS.

With Digital networking, the possibilities are nearly endless. Just think, it can all start with a single stackable hub in the Digital MultiStack System. Hub-by-hub your stack can grow; modules can migrate to the DEChub 900 MultiSwitch, a multitechnology chassis. Switches are added as your network expands across buildings, countries, and oceans to the far reaches of the world. And all the while, that same Digital 90-series module is still hard at work. That's value for a lifetime.

The cutting edge for business

Adding an edge workgroup to an already-strained network could bring productivity to a grinding halt. Not so, if you switch to the Digital MultiStack System. Digital's switching products let you switch traffic between a desktop client and a server, or between a backbone and a stacked LAN to give your new workgroup complete network connectivity. What's more, you get all the management and security you need, while increasing data flow and network performance. The Digital MultiStack System will stack up to the demands of individuals, workgroups, and enterprises — letting you add stackable hubs as you need them. Not only is it the most flexible way to extend your network, but it's also the most affordable. With the Digital MultiStack System, your cost per user is lower; overall network equipment costs are lower; and since a stack can be managed as a single domain using the HUBwatch management tool, your operations costs are reduced. What's more, you can mix and match Digital stackable hubs with DECswitch products to gain low-cost connections and increased network responsiveness anywhere in your network. Put your edge workgroups on the cutting edge — with the Digital MultiStack System.

***The Digital MultiStack System** is the only stackable hub that lets you start small while protecting your investments for a lifetime. From a single DEC repeater 90T-16 you can seamlessly scale up to larger stacked configurations. Or smoothly migrate your stackable hubs into the DEC hub 90 workgroup/department chassis. And even into the DEC hub 900 MultiSwitch multitechnology enterprise chassis. Whatever your media, configuration, or functionality requirements, the Digital family of networking products grows with you for the lifetime of your network.*





Specifications for Digital MultiStack System Stacking Unit

Height	6.86 cm (2.7 in)
Width	44.45 cm (17.5 in)
Depth	20.07 cm (7.9 in)
Weight	1.36 kg (3.0 lb)
Operating temperature	5°–50°C (41°–122°F)
Relative humidity	10% – 95% noncondensing
Power	0.35 W
Cooling	Convection

Electrical cables

Power

Stackable backplane (DETRX)	0.07 A @ 5 V, 0.00 A @ 12 V
Stackable backplane with AUI (DETAX)	0.07 A @ 5 V, 0.50 A @ 12 V (6.35 W) supplied for external AUI

How to order

To order, contact your local Authorized Digital Business Partner. In the United States, call 800-457-8211 for the business partner nearest you. Please specify part numbers as indicated below.

Digital part number	Description
DETRX-S*	Digital MultiStack System Stacking Unit
DETAX-U*	Digital MultiStack System Stacking Unit with AUI for DECRepeater 90T-16
DETML-S*	DECRepeater 90T-16 Stackable Unit
DETML-U*	DECRepeater 90T-16 Stackable Unit with AUI
DEFAR-S*	DECRepeater 90FA Stackable Unit
DETM-S*	DECRepeater 90TS Stackable Unit
DEFMI-S*	DECRepeater 90FS Stackable Unit
DEFMR-S*	DECRepeater 90FL Stackable Unit
DECMR-S*	DECRepeater 90C Stackable Unit
DENMA-S*	DECagent 90 Stackable Unit
DEWGB-S*	DECbridge 90 Stackable Unit
DEWGF-S*	DECbridge 90FL Stackable Unit
**	Access servers, routers, wireless, LAN analyzer

S* – S3: No Power Cord, SA: United States, SD: Denmark, SE: United Kingdom, SI: Italy, SK: Switzerland, ST: Israel, SX: Central Europe, SZ: Australia, SJ: India So. Africa

U* – U3: No Power Cord, UA: United States, UD: Denmark, UE: United Kingdom, UI: Italy, UK: Switzerland, UT: Israel, UX: Central Europe, UZ: Australia, UJ: India So. Africa

** – Order desired Digital 90-series module in addition to the Digital MultiStack System Stacking Unit.

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Digital Knows Networks

SPECIFICATIONS

Models	VM2310 / G	VM2320
<i>Display</i>	14" Softwhite Flat Screen Antiglare	14" Softwhite Flat Screen Antiglare
<i>Display Format</i>	24/25 X 80/132 Col with status line	24 X 80/132 Col with status line
<i>Character Attributes</i>	Bold, Blink, Underline, Reverse Video, Blank with selective erase	Bold, Blink, Underline, Reverse Video, Blank with selective erase
<i>Line Attributes</i>	Single/Double, all four combinations of height and width	Single/Double, all four combinations of height and width
<i>Max. Speed</i>	76.8 K baud on both serial ports	76.8 K baud on both serial ports
<i>Refresh rates</i>	62 Hz	62 Hz
<i>Character set</i>	ASCII, DEC, DEC Supplemental, User definable and PC sets	ASCII, DEC, DEC Supplemental, User definable set
<i>Scroll</i>	Jump/Fast/Slow and smooth scroll	Jump or smooth scroll
<i>Cursor</i>	Steady /Blinking cursor in Block or line	Steady/Blinking cursor in Block or line
<i>Keyboard</i>	101 keys PC AT Kbd	DEC VT220 styled 105 keys keyboard
<i>Programmability of keys</i>	Through Setup -150 key combinations 48 keys - user programmable	15 keys - user programmable
<i>Emulations</i>	VT220/VT100/VT52/ANSI-SCO/ AT386-M/PCTERM	VT220/VT100/VT52
<i>Communication</i>	Host - RS232 Serial Female DB25 AUX - RS232 Serial Male DB9 Printer - Centronics Parallel Flow control XON/XOFF, RTS/CTS or DSR/DTR or full modem control	Host - RS232 Serial Female DB25 AUX - RS232 Serial Male DB9 Printer - Centronics Parallel Flow control XON/XOFF, RTS/CTS or DSR/DTR or full modem control
<i>Graphics Emulations</i>	VM2310 G - TEK 4014 PC Graphics compatible besides 6 other emulations	
<i>Power Requirements</i>	90V to 264V 50 Hz 45 VA	90V to 264V 50 Hz 45 VA
<i>General</i>	Global printer port for spooling Password Facility Programmable CRT Save feature Programmable Status line Start up Banner message	Features as per DEC VT220

The VM23XX family of terminals are High quality, low cost, compact, smart video display terminals offering a high performance to cost ratio.

A choice of popular emulations provide high performance under multiuser UNIX environment. Disciplined raw material sourcing, State-of-the-Art manufacturing lines and stringent quality control measures ensure high reliability of VXL's VM23XX family of terminals.

Working on these terminals, one will experience perfect clarity of picture. High refresh rate and better display quality lessens eye strain. Full tilt and swivel help position the screen to appropriate the viewing angle.

Based upon last 14 years experience of VXL in the field of terminals, VM23XX family comes equipped with the latest features to enhance productivity. VXL's 0.8 Micron ASIC design ensures that your applications run much faster with communication speeds upto 76.8 K baud.

Over 150 function key combinations are programmable to speed up your data entry. You can assign specific strings to various function keys through your RDBMS calls. Scores of other useful features are also present. The AUX Serial port can be connected to Host and a spooler printer port. The printing request can be send to the spooler port without disturbing the user.

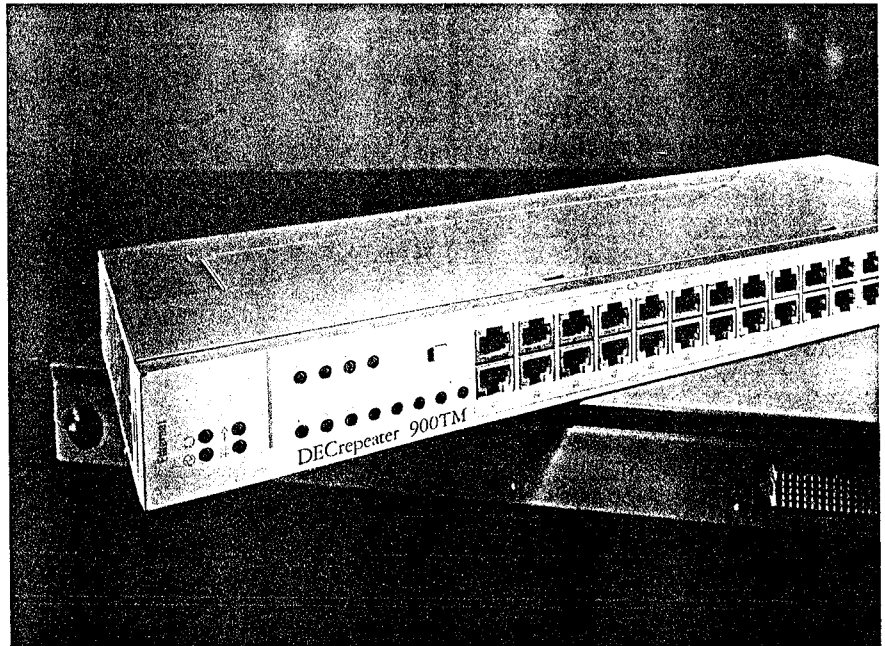


VXL INSTRUMENTS LIMITED
168, 1ST BLOCK, 7th Main
Koramangala,
Bangalore - 560 034
Tel. (0)80 5532000
Fax. 080 5530691

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DECrepeater 900TM

A Flexible, Cost-Effective Solution to Ethernet Connectivity

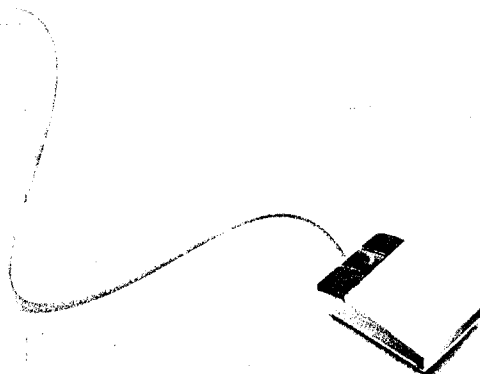


Looking for a simple, inexpensive, and versatile means of attaching your workgroup to an Ethernet local area network? You've found it with the DECrepeater 900TM. It combines a low cost per port with a high-performance management solution.

The DECrepeater 900TM can be configured your way: full-function standalone "rack and stack" DEChub ONE configuration, or installed in a DEChub 900 MultiSwitch. You can purchase what you need today, while protecting your investment for future growth.

The DECrepeater 900TM is supported by standard SNMP management. This provides statistics and control at the port level, and the ability to be identically managed both through the network (in-band) as well as outside the network (out-of-band) when combined with a DEHUA docking station using HUBwatch management software.

When installed in the DEChub 900 MultiSwitch backplane, the DECrepeater 900 TM can be integrated with Digital's DEChub 90 family of networking products for flexible network solutions — from the office to the enterprise.



Highlights

- Provides high port density — 32 10BaseT ports
- Operates either in a DEChub 900 MultiSwitch or as a rackmountable standalone DEChub ONE without modification
- Provides native SNMP management support for flexible management — for both the single-slot DEChub ONE or DEChub 900 MultiSwitch
- Secures network access to the port level by preventing unauthorized intrusion or eavesdropping
- Provides full retiming per port, not through separate, costly, and inefficient retiming module

Easily Upgradeable

Firmware upgrades can be made by updating the Flash memory over the network. This eliminates the necessity — and the cost — of replacing or upgrading your hardware. And, network users can work productively without disruption.

The network device utility (NDU) supports upgrading the DECRepeater 900TM over the network from an OpenVMS-, ULTRIX-, or DOS-based system. This means there is no need to dismantle the hardware to swap out ROMs.

Port Security

Repeater modules implement secure access control at the port level. Each port address is identified and compared to an authorized address. Only ports with properly matched addresses are allowed to transmit or receive packets.

For More Information

For more information call your local Digital sales representative or your authorized Digital reseller.

Specifications

<i>Height:</i>	44.45 cm (17.5 inches)
<i>Width:</i>	4.45 cm (1.75 inches)
<i>Depth:</i>	15.25 cm (6 inches)
<i>Weight:</i>	1.8kg (4 pounds)
<i>Operating Temperature:</i>	5° to 50° C (41° to 122° F)
<i>Relative Humidity:</i>	10% to 95% non-condensing
<i>Altitude:</i>	Sea level to 4800 m (16,000 feet)
<i>Power:</i>	20W @+5Vdc, 6W @+15Vdc
<i>Connectors:</i>	Shielded RJ-45
<i>Certification:</i>	CE, CSA, FCC, TUV, UL, VDE, VCCI
<i>Cooling:</i>	Fan

Ordering Information

Model Number	Description
DETMMA-MA and DEHUA-##	DECRepeater 900TM standalone DEChub ONE model
DETMMA-MA	DECRepeater 900TM hub-based
## DEChub ONE docking stations. Order country kits as needed. AA = United States, Canada, and Japan; AD = Denmark; AE = United Kingdom; AI = Italy; AK = Switzerland; AT = Israel; AX = Central Europe; AZ = Australia; BJ = India and South Africa	

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Networks

RouteAbout Access router family

The easy, affordable way to connect branch offices

Branch offices, remote sites, and home offices are playing an increasingly important role in the success of businesses today. But to operate at peak efficiency, these sites need to be connected to your backbone network. Digital's powerful new family of RouteAbout™ Access routers make connecting these offices simple and cost-efficient.

new family of products that put routing where you need it — in the routers, switches, and hubs throughout your network.

Digital's family of RouteAbout Access routers include:

- RouteAbout Access EW for Ethernet to Wide Area
- RouteAbout Access TW for Token Ring to Wide Area
- RouteAbout Access EI for Ethernet to Wide Area and ISDN

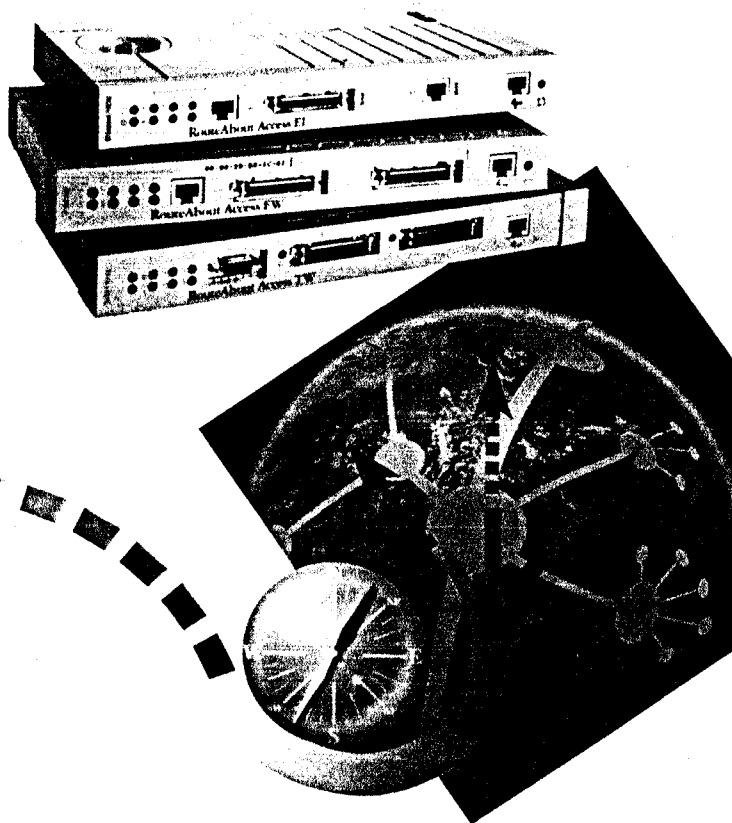
RouteAbout Access routers let you link your branch offices to a central site using a variety of cost-effective wide area services. They are also ideal for connecting to the global Internet — so that small offices can exchange mail and share information with other Internet users.

Since technical resources at these remote sites are usually limited, Digital has designed these powerful communications devices to be easy to install, configure, and manage.

The RouteAbout Access routers bridge and route all major protocols found in today's networks — including TCP/IP, Novell® IPX, DECnet®, OSI, and AppleTalk®. The software on these routers is the basis for a

The RouteAbout Access EW and TW routers connect remote offices with Ethernet or Token Ring LANs to a central site or the backbone network. In addition to the LAN interface, the EW and TW routers have two T1/E1 serial lines for connection to leased lines or public network services such as X.25 or Frame Relay.

The RouteAbout Access EI router connects remote sites using ISDN — the emerging standard for multimedia communication. In addition to the LAN interface, the EI has one T1/E1 serial line and one ISDN/BRI port.



Highlights

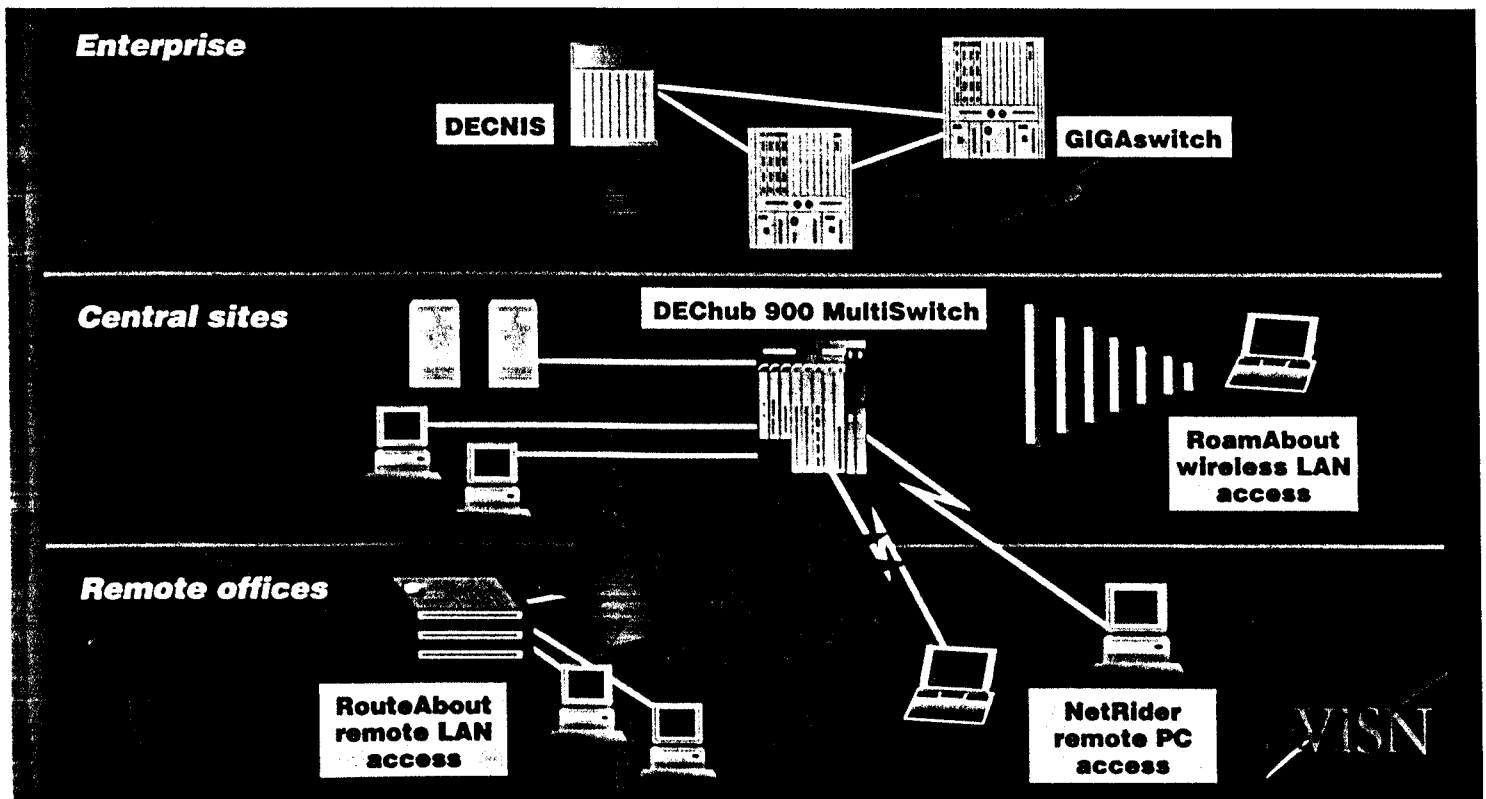
- Connects branch and remote offices with Ethernet or Token Ring
- Provides full protocol support by handling all major protocols in today's networks
- Grows with your business — use as standalone or hub-based component
- Ready to connect to the Internet
- Allows use of cost-effective public network services such as X.25, ISDN, and Frame Relay
- Allows remote management and monitoring from SNMP Network Management Stations
- Integrates IBM SNA and TCP/IP networks with DLSw support
- Includes factory-installed software to simplify installation at remote offices

Part of complete network solution

The RouteAbout Access router family is part of a comprehensive set of internetworking products that work together within Digital's *enVISN* architecture. *enVISN* is Digital's network architecture that integrates virtual LANs, distributed routing, and high-speed switching with centralized policy-based administration to create flexible

virtual networks that can be customized to accommodate application and business needs.

The same Distributed Routing Software is used on all the RouteAbout and DECswitch 900 family routers. Together, these products provide a complete network solution. Common software guarantees interoperability and reduces training and management costs.



Digital Knows Networks

Grows with your business

Today's powerful applications call for increasingly greater bandwidth or capacity. With the RouteAbout Access routers, you can easily respond to user demands for more bandwidth. As members of the DEChub family, RouteAbout Access routers let you start off small with a standalone module and later add that same module to a DEChub as your needs increase. Further growth can be handled cost-effectively by adding more RouteAbout or other networking modules to the hub — no need to replace your hub backplane.

Connect to the Internet

The RouteAbout Access family is ideal for providing access to the worldwide Internet. The Internet is the easy way to communicate with both customers and suppliers — and it can provide an excellent shop-window for your own products and services.

Consolidate SNA and multiprotocol networks

To eliminate the equipment, transmission, and management costs of running two separate networks, RouteAbout Access routers consolidate the SNA network onto the multiprotocol Internet. The routers locally terminate SDLC and LLC2 sessions to decrease timeouts and retransmissions and reduce WAN traffic. And they convert SDLC to LLC2 to simplify host connections.

Lowens transmission costs

RouteAbout Access routers support Bandwidth Reservation which ensures that certain classes of protocols have proper access to the available wide area bandwidth. They ensure acceptable response times by prioritizing traffic within each class, and filter out traffic that should not cross the wide area link.

Runs powerful new Digital Distributed Routing Software

These routers run the new Digital Distributed Routing Software that is used on the DECswitch 900 and other network products. This software supports the following protocols and features:

<i>Bridging</i>	Transparent (802.1d) Bridging, Source Route Bridging (SR), and Source Route Translational Bridging (SR-TB).
<i>Routing</i>	TCP/IP, Novell IPX, AppleTalk, DECnet Phase IV, and DECnet/OSI.
<i>Routing Protocols</i>	OSPF/RIP/EGP, Integrated IS-IS, IPX RIP, and AppleTalk RTMP.
<i>WAN</i>	PPP, Frame Relay, X.25, and Dial Backup.
<i>Features</i>	Packet filtering, packet prioritization and Bandwidth Reservation.
<i>SNA</i>	Data Link Switching (DLSw) and SDLC Relay. The DLSw implementation is IBM 6611 compatible.
<i>Management</i>	Configuration and management via TCP/IP TELNET. Monitoring via SNMP Network Management Stations. DEChub configuration via HUBwatch.
<i>SW Load</i>	Factory loaded in flash. Upgradable via BootP/TFTP.

The software is available in two packages:

<i>IP Software</i>	<i>Multiprotocol Software</i>
IP (RIP, EGP, OSPF)	All IP Software protocols plus:
Bridging	IPX
PPP	AppleTalk
Frame Relay	DECnet Phase IV
X.25	DECnet/OSI
Dial Backup	DLSw
Bandwidth Reservation	SDLC Relay



Ordering information

The RouteAbout Access router family comes as a complete package including the hardware unit with the software preloaded in the flash memory and the software license. A CD-ROM shipped with each router contains the software, the software documentation, and a Worldview[®] documentation reader. A hardware installation manual and a set of software quick reference cards are also included. To purchase a complete hardcopy documentation set, use the GZ kit listed below.

Order number	Description
DEX2R-F*	RouteAbout Access FW with IP Software
DEX2R-MB	RouteAbout Access FW with IP Software, Hub Version
DEX2R-ID*	RouteAbout Access FW with Multiprotocol Software
DEX2R-MA	RouteAbout Access FW with Multiprotocol Software, Hub Version
DEWTR-F*	RouteAbout Access TW with IP Software
DEWTR-ZA	RouteAbout Access TW with IP Software, Hub Version
DEWTR-ID*	RouteAbout Access TW with Multiprotocol Software
DEWTR-MA	RouteAbout Access TW with Multiprotocol Software, Hub Version
DEXBR-F*	RouteAbout Access EI with IP Software
DEXBR-MB	RouteAbout Access EI with IP Software, Hub Version
DEXBR-ID*	RouteAbout Access EI with Multiprotocol Software
DEXBR-MA	RouteAbout Access EI with Multiprotocol Software, Hub Version
QA-4BRAA-GZ	Bridge Router Software Hardcopy Documentation Set

Note: * denotes 3 = No Power Cord, A = U.S./Canada/Japan, D = Denmark, E = U.K./Ireland, I = Italy, J = India/Africa, K = Switzerland, T = Israel, X = Central Europe, Z = Australia/New Zealand

Serial adapter cables are required to connect the router to the data communication equipment. These should be ordered separately.

Order number	Description
BC12F-06	X.21 adapter cable
BC12G-06	V.35 adapter cable
BC12L-06	EIA 232/V.28
BC12J-06	EIA 530/A adapter cable
BC12H-06	EIA 422/EIA 449/V.11 adapter cable

Backed by Digital's world-class, worldwide service and support

Digital has an extensive portfolio of service offerings for the RouteAbout Access router family. For more detailed information, contact your local Digital Customer Service organization.

Call us

For more information about the RouteAbout Access router family or any other Digital product or service, please contact your authorized Digital distributor or local Digital sales office.

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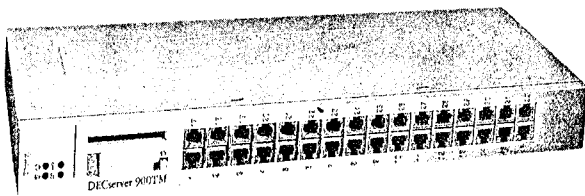
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DECserver 900 Remote Access Servers

The DECserver 900 family includes two members:

- The **DECserver 900TM**, which is configured with 32 individual MJ8 ports
- The new **DECserver 900GM**, which is configured with four 68-pin connectors also supporting up to 32 simultaneous connections



Highlights

- Provides the highest port density supporting up to 32 users and highest line speed at 115.2 Kb/s of any network access DECserver
- Supports DECserver Network Access Software for both PC remote access and legacy applications
- Provides software-selectable modem control options to support any modem
- Uses the DEChub 900 form factor

The DECserver 900 family provides high-density, high-performance, multiprotocol support for local or remotely connected PCs, Macintosh computers, terminals, serial printers, modems, and data switches. They support up to eight sessions per port and speeds up to 115.2 Kb/s per port. Each is "FLASH ready" configured with a FLASH external slot allowing self-booting operation.

Both the DECserver 900TM and the DECserver 900GM support 4-wire software-selectable modem control. Each operates either in the DEChub 900 MultiSwitch or as a rackmount or standalone module with the DEChub ONE.

The DECserver 900GM connector scheme additionally expands the software-selectable modem control options to include 8-wire modem control, provides enhanced cable management, and includes adapters for direct connection into 50-pin Telco wiring environments.

Ordering Information

Description	Part Number
The DECserver 900TM network access server	DSRVZ-MA
DECserver 900TM docking station	DEHUA-**

Ordering Tips:

- Docking stations are required for standalone DECserver 900TM systems. To order the appropriate c for United States, Canada, and Japan; AD for Denmark; AE for United Kingdom; AI for Italy; AK for Europe; AZ for Australia; BJ for India and South Africa.
- For remote node connectivity, choose Digital NetRider software upgrade kits that include the client's Digital NetRider information on page 4-5.

4 Access and Terminal Servers

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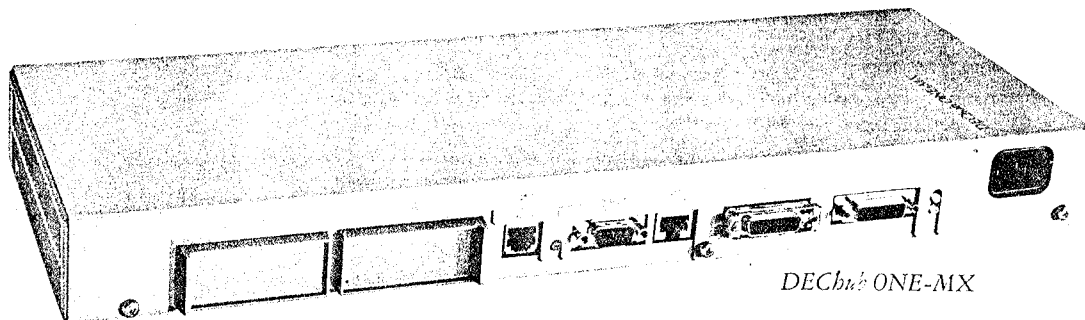
Networks

DEChub ONE — the Single-Slot Chassis Family

Turns DEChub 900 hub modules into full-function, stackable, single-slot hub products

Today, computer networks are moving targets. You constantly need to add new capabilities so your network can keep pace with your business. In a word, you need flexibility. Digital's DEChub ONE single-slot hub chassis products provide unmatched flexibility because they turn any DEChub 900 module into a full-function, stackable, single-slot hub product — without modification.

This single-slot hub chassis family provides the AC power, network connectivity, setup, and out-of-band management ports for all the current and future DEChub 900 modules. Simply snap the module into the chassis — and add a full-function stackable to your existing network or start a new one.



Features and benefits

- Turns any DEChub 900 hub module into a full-function stackable product
- Offers a choice of two single-slot hub chassis:
DEChub ONE: Ethernet chassis with 90 watts of power
DEChub ONE-MX: Ethernet/FDDI chassis that can be configured to provide redundant power capability

DEChub ONE-MX

(DEF1H) chassis:

- Provides redundant power capability when fault tolerance or redundant power is critical
- Provides Ethernet through an AUI port and FDDI connectivity through ModPMD ports

DEChub ONE (DEHUA) chassis (not shown)

The DEChub ONE (DEHUA) is a single-slot chassis designed to provide Ethernet-only connectivity through an AUI port, along with the necessary AC power, and an out-of-band management and setup port. Optional Ethernet MAUs can be used with the DEChub ONE to convert from the 15-pin AUI to fiber optic, ThinWire, or twisted-pair types of cable media.



DEChub ONE-MX chassis

The DEChub ONE-MX single-slot chassis extends the DEChub ONE family by offering redundant power capability as well as both FDDI and Ethernet support. In addition, it has a 6-pin MJ optical bypass relay port for connecting to an OBR device. Beyond FDDI support, this flexible one-slot hub chassis is the ideal solution if you're looking for fault tolerance in a stackable product. Providing 90 watts of power, it offers an automatic failover redundant power capability for all existing and planned DEChub 900 hubs. To achieve redundancy, two chassis can be configured in "piggy-back" fashion using the H9519-AA hardware kit, containing all the necessary hardware and power cable to connect the two units together.

For all the existing and future DEChub 900 Ethernet modules, network connectivity is supported through an AUI port for connecting to a standard Ethernet backbone. FDDI is provided through the two modular PMD ports. For FDDI applications, the DEChub ONE-MX utilizes the existing family of FDDI ModPMD's (single mode, multimode, and UTP), which must be ordered separately.

Ordering information

DEChub ONE

DEHUA-CA	U.S./Canada/Japan
-CD	Denmark
-CE	U.K.
-CI	Italy
-CK	Switzerland
-CT	Israel
-CX	Central Europe
-CZ	Australia
-DJ	India/South Africa

DEChub ONE-MX

DEF1H-##	FDDI single-slot hub
H9519-AA	Redundant power hardware kit

Order required country power kits below:

Country kits as needed. AA = United States, Canada, and Japan; AD = Denmark; AE = United Kingdom; AI = Italy; AK = Switzerland; AT = Israel; AX = Central Europe; AZ = Australia; BJ = India and South Africa

FDDI ModPMDs for DEF1H

DEFXU-AA	FDDI TP-UTP ModPMD
DEFXM-AA	FDDI ANSI MMF PMD
DEFXS-AA	FDDI SMF PMD

For more information

For more information about Digital's network solutions, contact your local authorized Digital reseller or consult with a Digital sales representative.

Service

Digital has an extensive portfolio of service offerings. For more detailed information, contact your local Multivendor Customer Services Specialist.

Specifications

Height	44.45 cm (17.5 inches)
Width	4.45 cm (1.75 inches)
Depth	10.16 cm (4.0 inches) 25.40 cm (10.0 inches)
Weight	1.59 kg (3.5 lb) 3.4 kg (7.5 lb)
Operating temperature	50°C to 500°C (410°F to 1,220°F)
Relative humidity	10% to 95% noncondensing
Altitude	Sea level to 4,900 m (16,000 ft)
Input power	100-120 Vac @ 2 A 220-240 Vac @ 1 A

DEHUA and DEF1H

Output power	90 watts maximum 50 W @ +5 Vdc 1 W @ +12 Vdc 30 W @ +15 Vdc	10 amps maximum 1 amp @ +5 Vdc 0.12 amp @ +12.0 Vdc 2 amp @ +15.0 Vdc
Connectors	MJ-8/RJ45 type setup port 9-pin DB-9 out-of-band management port 15-pin AUI Ethernet port MJ-6 OBR port — DEF1H only	
Certification	CE, CSA, FCC, TÜV, UL, VCCI	
Acoustics	Product operating mode Idle	LwAd* LPA** (Bels) (dBA) 5.1 37

* LwAd = Declared A-weight

** LPA = Declared Average
four Bystander Positions: 1
and 1.5 meters above the floor

Note: All data measured in

re 1 pW. (Note: 1 bel = 10 dB.)

measured in dB (re 20 uPa) at the
of the standard test table

and ISO 7779.

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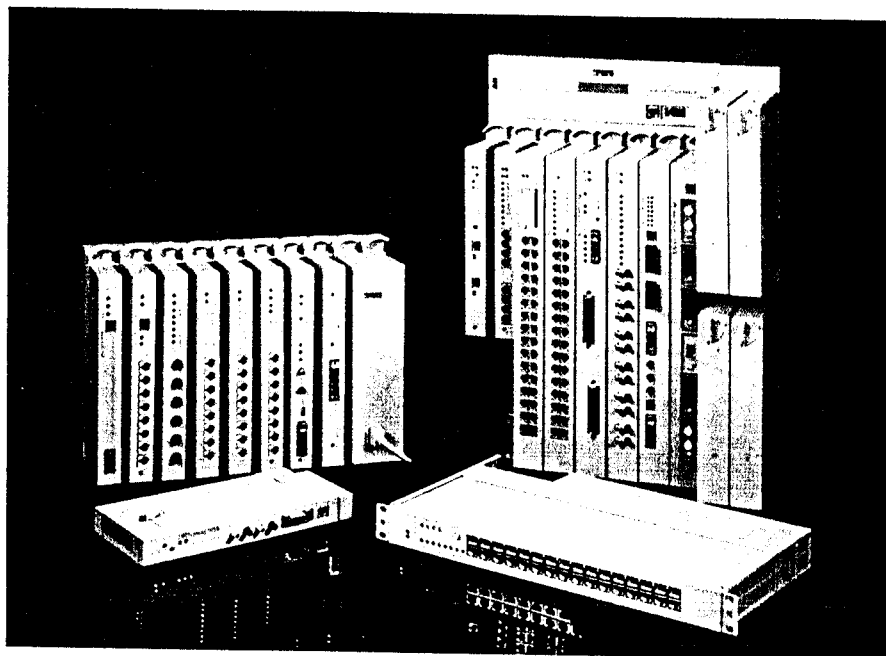
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The DECrepeater Family of Ethernet Repeaters

Reliable PC and Workstation Network Connectivity

digital



If your company is like most, you have an abundance of multivendor PCs and workstations that you want to connect to your corporate network — easily, reliably, and inexpensively.

Digital's family of DECrepeater products takes the guesswork out of PC and workstation network connectivity. They support all the popular cable types — including fiber optics, twisted pair, and coaxial.

The beauty of the DECrepeater family is that it does all repeating functions on a per-port basis. This unique design ensures maximum data throughput and eliminates the potential development of bottlenecks or — even worse — lost data. Digital's DECrepeaters can identify malfunctioning ports and automatically segment or restore them to avoid network disruption. They also feature individual status LEDs for each port.

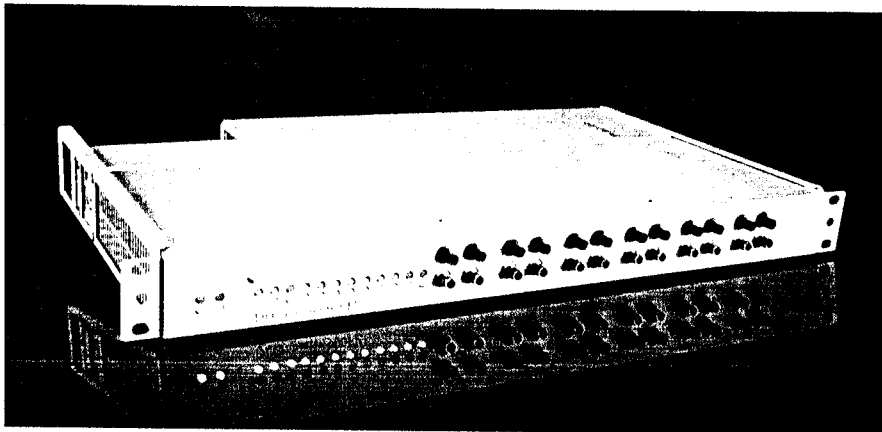
Only Digital's DECrepeaters give you the choice of three configuration options in a single product: standalone, rack-and-stack, or DEChub-based. This choice means that as your applications change, your configuration can also change — without the added expense of new hardware. So the DECrepeaters not only give you more options today, but also eliminate additional costs and obsolescence tomorrow.

When used as a standalone unit, the DECrepeater uses an external power supply. When installed in the backplane, the DECrepeater uses the backplane's power supply. All DECrepeaters can be hot-swapped from the DEChub backplane with no disruption to other users on the network.

In short, Digital's comprehensive family of DECrepeaters offers unprecedented flexibility, reliability, and affordability — for virtually any media your organization might have.

DECrepeater Fiber Family

The DECrepeater family of fiber modules provides a flexible, cost-effective way to create structured building or campus-wide fiber backbones. Like other members of the award-winning DEChub family, each fiber DECrepeater can be configured as a compact standalone unit, a rack-and-stack unit, or snapped into a multislot DEChub. These fiber DECrepeaters meet 10BaseFL and FOIRL industry standards for Ethernet fiber. And compatibility with 10BaseFL ensures maximum configuration distances and adds the flexibility to support both backbone and desktop applications. There are four members of Digital's fiber family: the DECrepeater 900FP, 90FS, 90FA and 90FL.



DECrepeater 900FP: Flexible, High-Density Fiber Connectivity for Ethernet LANs

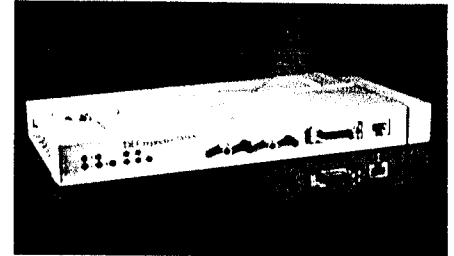
Highlights

- 12 port, high-density, 10BaseFL FOIRL fiber Ethernet repeater
- Fault-tolerant, dual-path redundancy with automatic failover
- Provides per-port security
- Per-pair port switching connects to up to six different LANs, which can be attached to six backplane flexible channels in the DEChub 900
- Operates and can be managed via SNMP in standalone, rack-and-stack, or multislot DEChub 900 MultiSwitch configurations

The DECrepeater 900FP is a high-density fiber repeater that offers unparalleled flexibility in configuring

fiber networks. You can connect six pairs of redundant ports, 12 individual fiber links — or any combination in between. In addition, you can link each pair of ports to a different LAN segment in standalone, rack-and-stack, or DEChub 900 configurations, and change those LAN connections as needed from a remote management station.

This Ethernet repeater lets you easily centralize your fiber network at a reasonable per-port cost. When configured with redundant ports, the repeater's automatic failover capability provides additional reliability. The DECrepeater 900FP uses SNMP — the de facto industry standard for managing network products. For firmware upgrades, simply update the flash memory over the network from a DOS, ULTRIX, or VMS system.



DECrepeater 90FS: Low-Cost Fiber Connectivity for Mixed-Media Environments

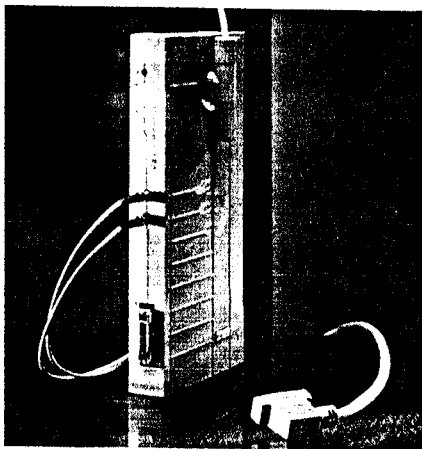
Highlights

- Two 10BaseFL/FOIRL fiber ports, one AUI port, and one ThinWire port
- Redundancy with automatic failover on 10BaseFL fiber ports
- Provides port security
- Attaches to one flexible Ethernet channel in DEChub 900
- Operates and is manageable via SNMP in standalone, rack-and-stack or multislot DEChub 900 MultiSwitch configurations

The DECrepeater 90FS is a versatile four-port repeater that provides low-cost connections to fiber, ThinWire, and a 15-pin AUI port. The DECrepeater 90FS is ideally suited for providing cost-effective backbone connectivity for the DEChubs.

When configured with redundant fiber ports, the repeater provides automatic failover to another link — for additional reliability.

For firmware upgrades, simply update the flash memory over the network from a DOS, ULTRIX, or VMS system, with no disruption to the network.



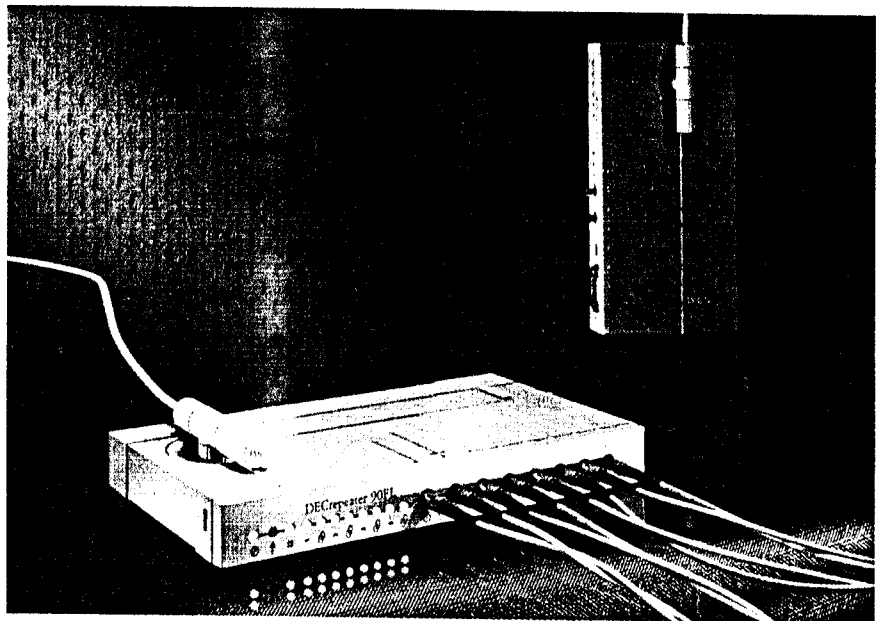
DECRepeater 90FA:
Low-Cost Connections to Fiber,
ThinWire, and AUI in One
Compact Module

Highlights

- One 10BaseFL fiber port, one AUI port, and one ThinWire port
- Offers full repeater functionality per port — automatically identifies and isolates faulty ports
- Manageable via HUB Manager or DECagent 90

The versatile DECRepeater 90FA provides connections to fiber, AUI and ThinWire. This repeater can be used in standalone, rack-and-stack, DEChub 90, and DEChub 900 MultiSwitch configurations. As a standalone unit, it provides a fiber optic link between two Ethernet LANs. It can also connect a standard Ethernet backbone and ThinWire segment. In a DEChub, the DECRepeater 90FA offers a point-to-point connection via fiber optic cable. Its 15-pin AUI port provides a low-cost thick wire backbone connection for hub-based applications.

Using the appropriate DECagent, you can remotely manage the DECRepeater 90FA in the hub using SNMP. Among its other features is the ability to automatically isolate faulty ports — allowing uninterrupted network operation.



DECRepeater 90FL:
Connects Multiple Hubs in a Campus-wide Fiber Backbone

Highlights

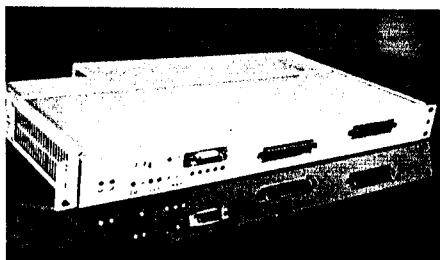
- Four 10BaseFL ports
- Offers full repeater functionality per port, including automatic identification and isolation of faulty ports
- Manageable via HUB Manager or DECagent 90

The DECRepeater 90FL is a multiport fiber optic repeater that can interconnect multiple DEChub 90/900 units or 10BaseFL-compliant products in a star-wired environment. Featuring four fiber ports and one ThinWire port, the DECRepeater 90FL lets you use the DEChub as an enterprise network solution that interconnects workgroup, building, and campus backbone wiring. You can use its four fiber ports to create a large LAN from a central location. You can also extend fiber connections to DEChub units on other floors and in other buildings.

The DECRepeater 90FL can be used in standalone, rack-and-stack, DEChub 90, and DEChub 900 MultiSwitch configurations. It provides full repeater functionality per port. The repeater identifies malfunctioning ports and automatically segments or restores them. You can remotely manage the DECRepeater 90FL in the hub using SNMP.

DECrepeater Twisted Pair Family

Digital's twisted pair DECrepeaters are available in standalone, rack-and-stack, and hub-based configurations — so you can buy only what you need, and avoid future costs and obsolescence when changing from one configuration to another. You can easily make firmware upgrades to the DECrepeater 900GM and DECrepeater 900TM by updating the flash memory over the network from a DOS, ULTRIX, or VMS system. This capability eliminates the necessity of replacing or upgrading hardware — and helps prevent network disruption. Digital offers a choice of three twisted pair repeaters: the DECrepeater 900GM, 900TM, and 90T.



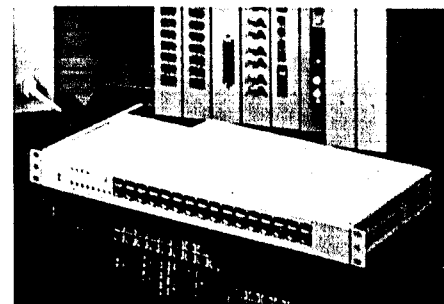
DECrepeater 900GM: Low-Cost, High-Density Connectivity for Ethernet LANs

Highlights

- 24-port 10BaseT Ethernet repeater using TELCO connectors plus an AUI connection
- Per-port security
- Supports shielded and unshielded twisted pair
- Attaches to one of six flexible channels in the DEChub 900
- Powerful, easy management via SNMP

The DECrepeater 900GM is a highly flexible repeater for creating Ethernet networks — a single repeater can serve as the total LAN solution for many small branch offices. In addition to being a standalone unit, it can be a rack-and-stack solution when combined with other Digital repeater products, or configured as part of a DEChub 900 MultiSwitch solution for a very high density, high functionality enterprise network. When coupled with the DEChub ONE docking station and appropriate adapter, the DECrepeater 900GM supports your choice of AUI, ThinWire, twisted pair, or 10BaseFL (fiber) for easy connection to backbone networks.

The DECrepeater 900GM lets you build and manage secure, high density Ethernet LANs at very low cost per connection while using existing wiring.



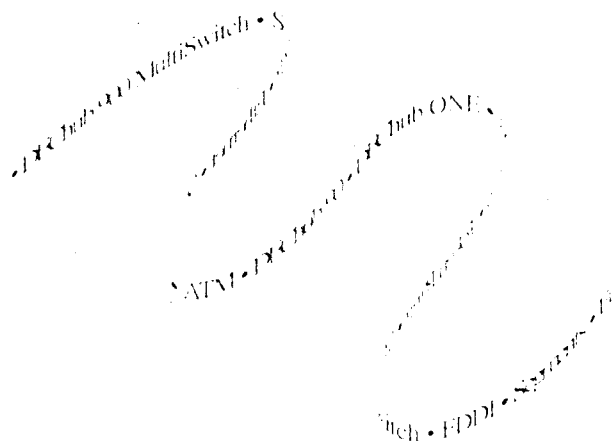
DECrepeater 900TM: A Flexible, Cost-Effective Solution for Connecting Workgroups to an Ethernet LAN

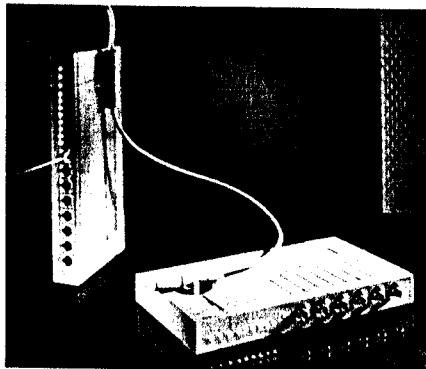
Highlights

- 32 10BaseT ports for high port density
- Per-port security
- Supports shielded and unshielded twisted pair
- Attaches to one of six flexible channels in DEChub 900
- Provides native SNMP management

The DECrepeater 900TM combines a low cost-per-port with a high-performance management solution. Without modification, the DECrepeater 900TM can be configured as a full-function standalone or rack-and-stack unit, or can be installed in a DEChub 900 MultiSwitch.

The DECrepeater 900TM is supported by standard SNMP management, which provides statistics and control at the port level — plus the ability to be identically managed both through the network (in-band) as well as outside the network (out-of-band) when combined with a DEHUA docking station using HUBwatch management software.





DECRepeater 90T: A Multiport Repeater Offering Ethernet Connectivity

Highlights

- 8-port 10BaseT and 1 ThinWire backbone connection
- Fully compatible with IEEE 802.3 10BaseT and 10Base2 standards
- Full repeater functionality per port
- Automatically identifies and isolates faulty connections

The DECRepeater 90T is a 10BaseT-compliant repeater that connects PCs, workstations, or any 10BaseT device to the Ethernet LAN. The DECRepeater 90T provides one ThinWire coaxial port and eight twisted pair, RJ45 8-pin modular jacks. The DECRepeater 90T is manageable by SNMP when installed in the DEChub with the appropriate agent. Front-panel LED indicators make it easy to see repeater and network status at a glance.

The repeater can be used in standalone, rack-and-stack, DEChub 90 and DEChub 900 MultiSwitch configurations.

ThinWire Coaxial Repeater

Completing Digital's family of Ethernet repeaters is the DECRepeater 90C, for environments where you have ThinWire coaxial cable.

DECRepeater 90C Ethernet Repeater:

Low-Cost, Multiport Ethernet Connectivity

Highlights

- 6 ThinWire ports and 1 ThinWire backbone connection
- Fully compatible with IEEE 802.3 10Base2 standards
- Can be used in standalone, rack-and-stack, and hub-based configurations
- Full repeater functionality per port
- Automatically identifies and isolates faulty connections

Digital's repeater for coaxial cable applications, the DECRepeater 90C provides the maximum throughput for workgroup connectivity. Each ThinWire port supports up to 185 meters of ThinWire cabling. The DECRepeater 90C supports a total of seven ThinWire connections, and allows up to 29 stations to be attached to each ThinWire port.

The repeater can be used in standalone, rack-and-stack, DEChub 90 and DEChub 900 MultiSwitch configurations. Front-panel LED indicators make it easy to see repeater and network status at a glance. This module is remotely manageable by SNMP when installed in a DEChub with the appropriate agent.

Why Digital?

Digital is the acknowledged leader for multivendor network solutions for open network computing. A major force in computer networking worldwide, Digital has more than 17 years of experience and five generations of networking products. Providing complete network services for integrating your network, Digital offers multivendor connectivity and flexible networks that change as your needs change — while protecting your investment. Digital integrates MS-DOS[®], Windows[™], UNIX[®], OpenVMS VAX, and Macintosh[®] systems — while supporting industry standards, including IEEE 802.3, 10BaseT, EIA, NT[®], OS/2[®], TCP/IP, ANSI and more.

Digital's Modular DEChub Design Protects Your Networking Investment

Whether you need a single module on a desktop, or dozens of modules combined in interconnected hubs across a corporation — or anything in between — the unique design of the DEChub family supports cost-effective network growth at every stage of implementation. Other family members, including routers, bridges, multiprotocol and LAT-only terminal servers, and management modules can be easily installed in a DEChub. The DEChub family is designed for both office environments and wiring closets. Digital's hub-based solutions keep the cost of networking low — while supporting the growth and integration of workgroup or department LANs into larger, enterprise-wide configurations.

For example, you can start with one repeater to connect PCs and workstations in a small LAN. As your networking needs expand, the same repeater can be combined with WorkGroup Family terminal server, bridge, and management modules in the DEChub. In this way, you can quickly and easily adapt your network to accommodate changing requirements — while protecting your original investment.

For More Information

For more information about the DECRepeater family of products, please contact your local Digital sales office or Authorized Digital Distributor.

In the U.S., call 800-DIGITAL (800-344-4825).

Ordering Information

DECRepeater 900FP:

DEFMM-MA:	Hub-based model without power supply
DEHUA-## and DEFMM-MA:	Standalone/rack-and-stack model with power supply
DEHUA-##	Single-slot Ethernet DEChub ONE, required with DEFMM-MA for standalone use, provides AUI network connector, power supply, hub setup port, hub OBM port

DECRepeater 90FS:

DEFMI-MA	Hub-based model without power supply
DEFMI-##	Standalone/rack-and-stack model with power supply

DECRepeater 90FA:

DEFAR-MA	Hub-based model without power supply
DEFAR-##	Standalone/rack-and-stack model with power supply

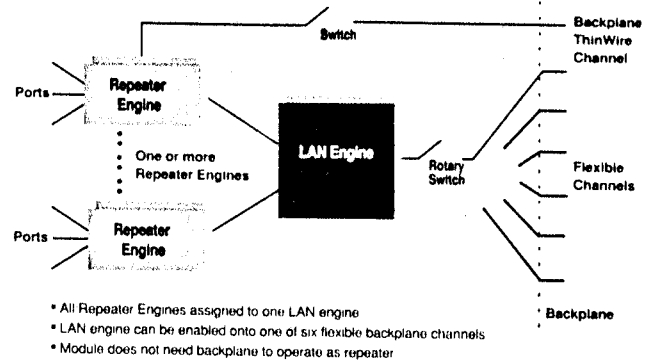
DECRepeater 90FL

DEFMR-MA	Hub-based model without power supply
DEFMR-##	Standalone/rack-and-stack model with power supply

DECRepeater 900GM

DETTM-MA	Hub-based model without power supply
DETTM-MA and DEHUA-##	Standalone/rack-and-stack model with power supply
DEHUA-##	Single-slot Ethernet DEChub ONE, required with DETTM-MA for standalone use, provides AUI network connector, power supply, hub setup port, hub OBM port

DEChub 900 Ethernet Repeater Architecture Module Level LAN Switching



DECRepeater 900TM

DETMM-MA	Hub-based model without power supply
DETMM-MA and DEHUA-##	Standalone/rack-and-stack model with power supply
DEHUA-##	Single-slot Ethernet DEChub ONE, required with DETMM-MA for standalone use, provides AUI network connector, power supply, hub setup port, hub OBM port

DECRepeater 90T

DETM-MA	Hub-based model without power supply
DETM-##	Standalone/rack-and-stack model with power supply

DECRepeater 90C

DECM-MA	Hub-based model without power supply
DECM-##	Standalone/rack-and-stack model with power supply

** Order country kits as needed.

AA = United States, Canada, and Japan; AD = Denmark;
AE = United Kingdom; AI = Italy; AK = Switzerland; AT = Israel;
AX = Central Europe; AZ = Australia; BJ = India and South Africa

Order country kits as needed.

CA = United States, Canada, and Japan; CD = Denmark;
CE = United Kingdom; CI = Italy; CK = Switzerland; CT = Israel;
CX = Central Europe; CZ = Australia; DJ = India and South Africa

Media Access Units — to connect standalone DECRepeater 900 series to fiber, ThinWire or twisted pair, order the MAU that meets your media needs:

DETPM-AA	AUI X 10BaseT (UTP) MAU
DECXM-AA	AUI X 10Base2 (ThinWire) MAU
DEFLM-AA	AUI X 10BaseFL (fiber) MAU

Specifications

DECrepeater 900 Series Modules

	Hub-based	Standalone/ Rack-and-stack
Height	44.45 cm (17.5 in)	44.45 cm (15.5 in)
Width	4.45 cm (1.75 in)	4.45 cm (1.75 in)
Depth	15.25 cm (6 in)	25.4 cm (10.0 in)
Weight	1.8 kg (4 lb)	3.4 kg (7.5 lb)
Operating temperature	5° C–50° C (41° F–122° F)	5° C–50° C (41° F–122° F)
Relative humidity	10%–95% noncondensing	10%–95% noncondensing
Altitude	Sea level to 4900 m (16,000 ft)	Sea level to 4900 m (16,000 ft)
Power	20 W@+5 Vdc, 6 W@+15 Vdc	20 W@+5 Vdc, 6 W@+15 Vdc
Certification	CE, CSA, FCC, TÜV, UL, VDE, VCCI	CE, CSA, FCC, TÜV, UL, VDE, VCCI

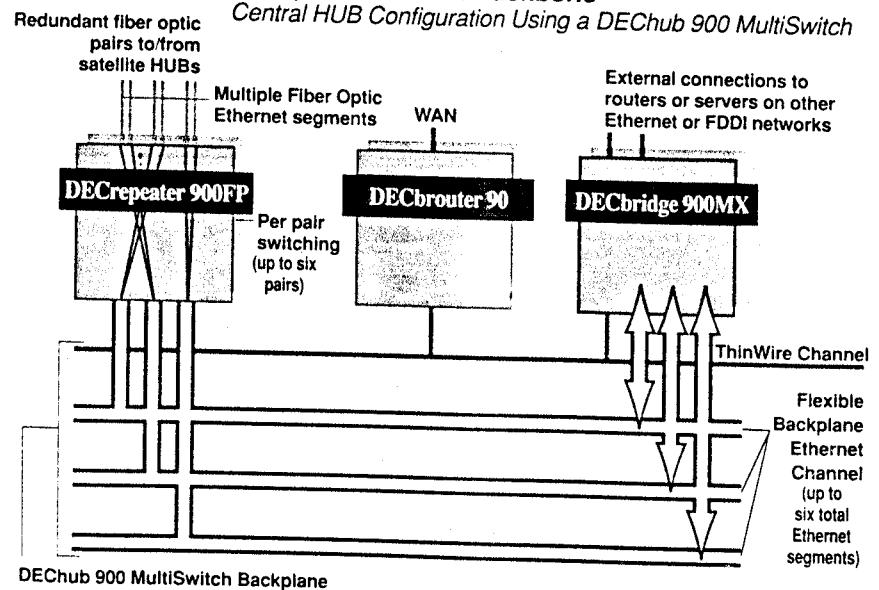
DECrepeater 90 Series Modules

	Hub-based	Standalone/ Rack-and-stack
Height*	27.9 cm (11.0 in)	27.9 cm (11.0 in)
Width	3.2 cm (1.3 in)	3.2 cm (1.3 in)
Depth	14.0 cm (5.5 in)	14.0 cm (5.5 in)
Weight	.77 kg (1.7 lb)	.77 kg (1.7 lb) without power supply
Operating temperature	5° C–50° C (41° F–122° F)	5° C–50° C (41° F–122° F)
Relative humidity	10%–95% noncondensing	10%–95% noncondensing
Altitude	Sea level to 2.4 km (8,000 ft)	Sea level to 2.4 km (8,000 ft)
Power	1.8A @+5.1V, 0.8A @ 12V	1.8A @+5.1V, 0.8A @ 12V
Certification	CE, CSA, FCC, TÜV, UL, VCCI	CE, CSA, FCC, TÜV, UL, VCCI

*DECrepeater 90FS height is 29.2 cm (11.5 in)

Collapsed Ethernet Backbone

Central HUB Configuration Using a DEChub 900 MultiSwitch



Digital's DECrepeater Family At-a-Glance

Fiber Repeaters

DECrepeater 900FP: high-density, 12-port 10BaseFL repeater; fault-tolerant, dual-path redundancy with automatic failover, per-pair port switching and per-port security.

DECrepeater 90FS: versatile, four-port repeater that provides two fiber ports, one ThinWire, and a 15-pin AUI port. Offers redundancy with automatic failover on 10BaseFL fiber ports, and per-port security.

DECrepeater 90FL: featuring four fiber ports and one ThinWire port, this multiport fiber-optic repeater can interconnect multiple DEChub 90 or DEChub 900 MultiSwitch units or 10BaseFL-compliant products in a star-wired environment.

DECrepeater 90FA: versatile three-port repeater that provides low-cost connections to fiber, ThinWire, and a 15-pin AUI port. Ideally suited for providing cost-effective backbone connectivity.

Twisted Pair Repeaters

DECrepeater 900GM: 24-port 10BaseT repeater using TELCO connectors plus an AUI connection. Provides per-port security. Supports AUI, ThinWire, twisted pair or 10BaseFL for easy connection to backbone in standalone configuration.

DECrepeater 900TM: 32-port 10BaseT repeater for use with either 100-ohm shielded or unshielded twisted pair wire. Provides per-port security. Supports AUI, ThinWire, twisted pair or 10BaseFL for easy connection to backbone in standalone configuration.

DECrepeater 90T: Eight-port 10BaseT-compliant repeater used to connect PCs, workstations, or any 10BaseT device to the Ethernet LAN. Provides one ThinWire coax port and eight twisted-pair, RJ-45 eight-pin modular jacks.

ThinWire Coaxial Repeaters

DECrepeater 90C: Seven-port 10Base2-compliant repeater used to connect PCs, workstations, or any 10Base2 device to the Ethernet LAN. Supports up to 29 stations per port over a maximum distance of 185 meters of ThinWire (RG58 type) coaxial cable.

Digital believes the information in this publication is accurate as of its publication date; such information is subject to change without notice. Digital is not responsible for any inadvertent errors.

Digital will conduct its business in a manner that conserves the environment.

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Internet AlphaServer Systems Software V3.0 and Internet AlphaServer Software V3.0 for Digital UNIX

Highlights

- * *Internet AlphaServer Systems Software ships with "Internet-energized" Digital UNIX AlphaServer systems*
- * *Most popular Internet applications including the Apache Web Server available in one package*
- * *White Pine Internet video-conferencing software, Enhanced CU-SeeMe, included for a 30-day free trial*
- * *Seamlessly integrates into a TruCluster Available Server with automatic failover of logins, Internet news, proxy, web, and mail services*
- * *Script-driven installation allows for selected functional installation*

Product description

Digital offers two packages of ready-to-use, proven and integrated software for the Internet and Intranets. The Internet AlphaServer Systems Software (IASS) 3.0 is bundled with AXP 1000A processors ordered after December 1996. The Internet AlphaServer Software (IAS) 3.0 is an extension to the IASS and provides additional enhancements and enriched functionality, particularly in the area of secure commerce over Internet and home page content creation.

Internet AlphaServer Systems Software V3.0 for Digital UNIX (bundled)

Available as a standalone product for existing servers and users of AlphaStation workstations, Internet AlphaServer Systems Software V3.0 for Digital UNIX now ships with every Digital UNIX AlphaServer from AlphaServer 400 to AlphaServer 8400 systems. This package includes

- * Internet AlphaServer Administration Software -- Manages services using a web interface to
 - Manage user accounts (add, delete, modify, etc.)
 - Manage local printers and print queues
 - Facilitate system backups
 - Configure security
 - Administer news groups
- * Apache Web Server V1.0.5 software -- Facilitates document publishing using HTTP on the Internet and internal TCP/IP networks
 - Creates domains of access across networks
 - Defines who has access to particular resources
 - Delivers performance and reliability through improved process and memory management coupled with Digital UNIX and Alpha systems
- * Specific third-party public software
 - Perl UNIX shell scripting language
 - SendMail, IMAP, Popper, and QPOP mail servers
 - CERN server with HyperText proxy and caching
 - INN Network News Server
 - PINE Mail Client
 - Reflector (Allows CU-See Me clients group and video conferencing)
 - Enhanced CU-SeeMe video conferencing software (cameras and sound cards required)
 - TCL shell and the CGI extension
 - TINN Network News Reader
 - Wide Area Information Server (WAIS) system
 - LYNX HyperText interface for ASCII terminals
 - NCSA HTTPd hypertext server
 - tcpwrapper enhanced Internet security

- TRN threaded news reader program
 - Expect-TCL utility
- * Digital UNIX CD-ROM (matches the version of Digital UNIX that is factory installed on the system disk)

White Pine's Enhanced CU-SeeMe and Reflector software is available on a 30-day free trial for group conferencing, meetings, or just chatting. Reflector is a server-based application that allows CU-SeeMe clients to have group conferences, and provides video broadcasts to large audiences anywhere on the Internet or over a LAN. It accepts multiple CU-SeeMe client connections and reflects the video, audio, and additional data to all participants concurrently. Depending on hardware and network configurations, a single UNIX AlphaStation or AlphaServer system can support as many as 100 active participants. Multiple Reflector sites can be linked to create a network for larger group conferences or video broadcasts.

With enhanced CU-SeeMe client software, coupled with Reflector technology, a group can interactively share documents and information with integrated collaborative solutions such as whiteboard, chat window, and web browser support. The Enhanced CU-SeeMe client software runs on Windows 3.1 or Windows 95. CU-SeeMe also requires a sound card with 8-bit sound, a microphone input (needed for sending), speaker output, and a video camera with serial-port digitizer or video camera with standard NTSC output.

Public software is available for use under the terms and conditions of the original authors, and is provided "as is" without warranties or support. Digital supports tcpwrapper and INN Network News Reader. Complete documentation is available online in HTML format.

Internet AlphaServer Software V3.0 for Digital UNIX (priced separately)

Comprising everything in the list for Internet AlphaServer Systems Software (IASS) V3.0, it also includes

- * Netscape Communication Server V1.12, which facilitates publishing documents on the Internet and on internal TCP/IP networks using HTTP to
 - Create domains of access across any network
 - Define who has access to particular resources
 - Deliver performance and reliability through improved process and memory management coupled with Digital UNIX and Alpha systems
 - Deliver documents several times faster, with throughput that is several times greater than with other available HTTP servers
- * All documentation in hard copy format
- * Provides advanced capabilities for content creation and management that includes WYSIWYG editing, full text search and revision control
- * Extends development platform to include open, server-side applications and is incidentally the first server to support Java and JavaScript applications
- * Increases security and network management capabilities through SSL 3.0, client certificates and advanced access controls with support for secure, remote, X-platform administration, SNMP based management and reporting
- * Employs second-generation performance enhancements including SMP support

Two optional software packages are available separately:

- * TRUcluster DECsafe Available Server environment -- In the event of a system failure, the news server, proxy server, user logins, mail services, and web pages will restart on another server in less than 30 seconds.
- * AltaVista firewall protection -- Prevents unauthorized access to sensitive information.

Benefits

- * "Internet-energized" AlphaServer systems enable immediate use of the Internet or intranets with no additional applications needed for basic mail, news, web serving and caching. No other UNIX vendor offers this tier of functional support.
- * AlphaServer systems provide leadership performance for lower cost, including the new SPECweb96 benchmark.
- * 30 Day trial White Pine Reflector and Enhanced CU-See Me software lets users try leading edge, award winning Internet desktop video conferencing software for real time person-to-person or group conferencing or group collaboration not found in any other video conferencing product (Additional Hardware may be required for CU-See Me)
- * Built-in security - Includes tcpwrapper, password access and optional Alta Vista firewall protection
- * Choice of mail servers - POP3, IMAP, PINF, SMTP, QPOP, Sendmail and Popper
- * Includes INN News server without charge
- * Optional TRUcluster DECsafe Available Server environment - In the event of a system failure, the News server, proxy server, user logins, mail services and web pages will restart on another server in less than 30 seconds

Competitive Analysis

Digital has eclipsed all other UNIX vendors by shipping "Internet-energized" systems. Digital ships all its AlphaServer systems complete with all the software typically used on an Internet or intranet system at no additional cost, with 90-day software warranty support.

In the most recent SPECweb96 benchmark results published by the Standard Performance Evaluation Corp. (SPEC), of Manassas, Va., Digital turned in the highest performance numbers.

- * A 4-CPU AlphaServer 2100A 5/300 system running at 300 MHz outperformed a 2-CPU Hewlett-Packard K400 by 62 percent while using 40 percent less memory. The AlphaServer 2100 symmetric multiprocessor (SMP) system is optimized for Internet, intranet, database, application, and technical computing tasks. It supports up to four CPUs and up to 2 GB of memory.
- * A 2-CPU AlphaServer system outperformed a 2-CPU Hewlett-Packard K400 by 13 percent while using 50 percent less memory.
- * A single-processor AlphaServer 1000A 4/266 system provides the highest uniprocessor SPECweb96 performance, 16 percent higher than a Hewlett Packard D210, while using 225 percent less memory.

Based on previous benchmark testing by Digital, the Internet AlphaServer systems far outperformed the competition in the Internet performance benchmark.

- * Using Netscape Communications Software V1.1 for Digital UNIX, the single-processor AlphaServer 400 4/233 was able to support 109,680 16 KB files-per-hour, compared with 66,220 files on the dual-CPU Sun Netra i20 system -- a more than 60 percent advantage. The Alpha system costs considerably less than the Sun system. These performance numbers
 - Ensure that the new Internet AlphaServer systems will meet demand spikes typically incurred when many users flock to a server to learn about new products and services
 - Ensure that, as the need for larger files evolves for multimedia web page implementations, the server can handle the increased load

Digital is the only vendor to include an external news server. Sun users must purchase a third-party news server at a cost of over \$2,000. An Internet AlphaServer system is capable of handling thousands of news groups on one server versus competing systems requiring two and three servers to hold feeds from all the news services.

Internet security -- Internet AlphaServer Software V3.0 includes tcpwrapper for enhanced Internet security; a major advantage over Sun. Digital UNIX operating system security has passed the infamous SATAN checks. The Internet AlphaServer Administration Software operates in the optional C2 environment and will run with any optional, commercially available firewall product, including Digital Firewall for UNIX. Server software security can be controlled by requiring passwords to access selected pages. Applications can be secured through the use of tcpwrapper.

Domain name limits -- Digital UNIX can support virtually unlimited simultaneous domain names on one server. This capability is important for Internet service providers, who need to serve multiple domain names for their users. Companies hosting multiple individuals or organizations quickly reach the Sun and SGI 256 simultaneous domain name limit.

Internet AlphaServer Software V3.0 also supports the Advanced File System. Some industry analysts have called it the best UNIX file system, which allows file management to be accomplished anytime, even while users are accessing the files.

With the optional TRUcluster DECsafe Available Server environment, Digital enables automatic failover of the news server, proxy server, user logins, mail services, and web services. News server restarts on another server, typically in less than 30 seconds, web server restoration occurs in 10 seconds, CERN proxy serving restarts in 10 seconds, and user logins are restored at .001 minute. This is especially useful for Internet service providers who have high availability demands and large user populations. Sun's high availability configurations are limited to only two nodes.

Availability and ordering

Internet AlphaServer Software V3.0 and Internet AlphaServer Systems Software V3.0 for Digital UNIX are available now from Digital and its business partners.

Services

The Internet AlphaServer Administration Software and the Netscape Communications Server include 90-day warranty support. In addition, Digital offers Internet support for network planning and implementation, server installation, web site construction, and other Internet services. Pricing and ordering details are available on request.

Technical data

- * Minimum software requirement -- Digital UNIX V3.2C
- * Minimum hardware requirement -- Any Alpha system supported by Digital UNIX
- * Recommended minimum memory configuration -- 32 MB



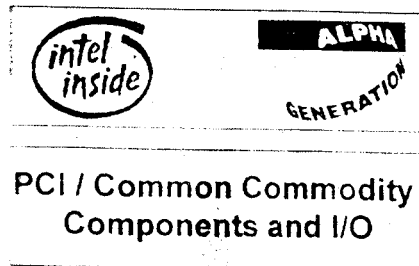
Digital : A Leader in Technology



- has over 20 years of networking experience
- has connected over 2.5 Million Ethernet nodes
- invented terminal servers, bridges, routers & gateways
- owns and runs the worlds largest private network
- first company to use Internet WWW 24x7x365..



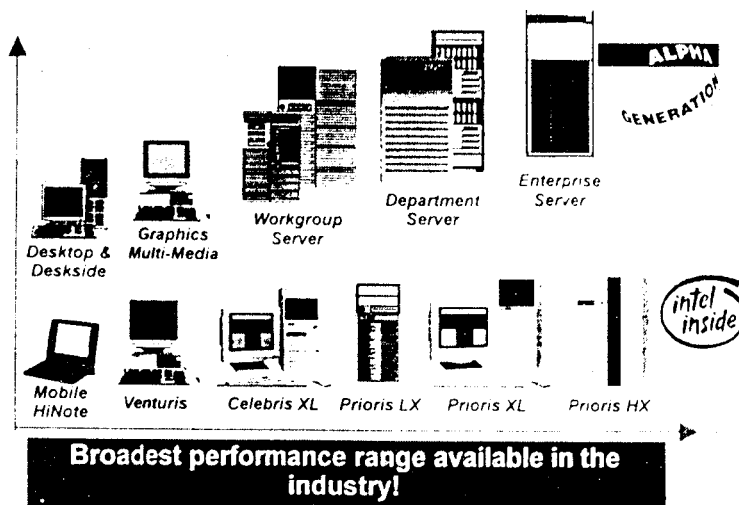
Digital's dual platform strategy



*Common System
Platforms
with Open PCI Bus*



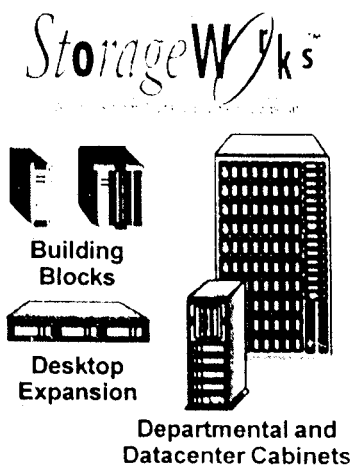
Digital's family approach to clients and servers



The I/O platform

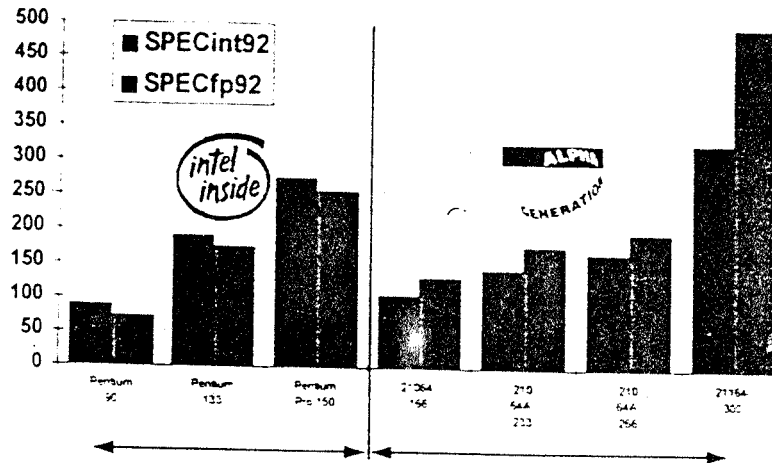
StorageWorks

- A single storage solution for the key computing platforms
- Meets customer demand for open, high-performance and high-availability subsystems that are competitively priced
- Includes a complete choice of industry-standard storage devices





Intel and Alpha combine to provide the broadest performance range



Digital PC Products Road Map

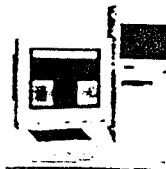
Desktop & Workstations

General
Business
User



Digital Ventures

Advanced
Productivity



Digital Celebris GL

Power
Client

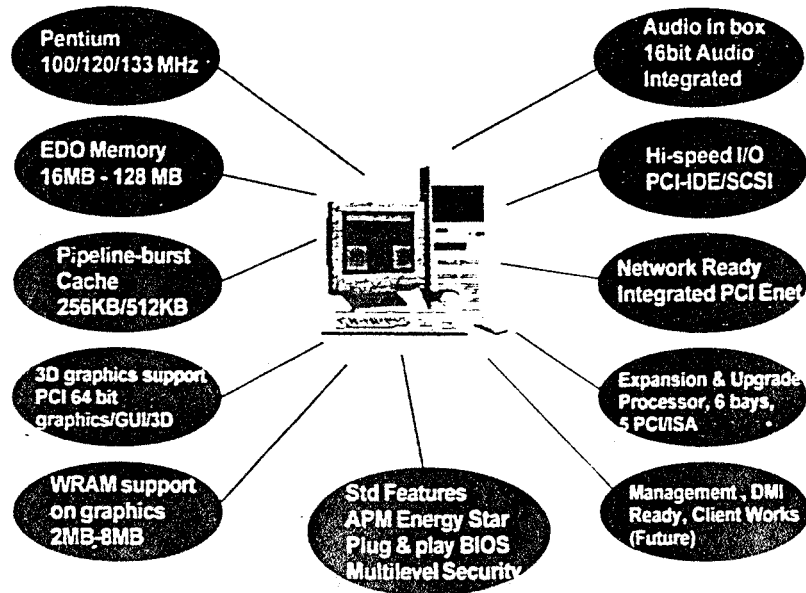


Digital Celebris XL

Processor	Pentium	Pentium	Pentium & Pentium Pro
Max Speed	133 MHz	133 MHz	133/160 MHz
Bus Tech	PCI/ISA	PCI/ISA	PCI/ISA
Memory	8-128 MB	16-128MB EDO	16-192/512 MB
Graphics	64bit LB	64bit LB	64/128bit LB Alpha AXP Upgrade



Digital Celebris GL



Digital PC Product Road Map

Servers

Workgroup



Prioris LX

Application

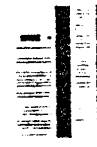


Prioris XL

Enterprise



Prioris HX



Prioris HX-MP

	Prioris LX	Prioris XL	Prioris HX	Prioris HX-MP
Processor	Pentium	Pentium	Pentium	Pentium
# of Procs	1	2	2	4
Max Speed	90/120 MHz	100/120MHz	133 MHz	100/133 MHz
Bus Arch.	PCI/EISA	PCI/EISA	PCI/EISA	PCI/EISA
Max Storage	14/16GB	20/24 GB	28/36 GB	28/36GB
Memory	16-192 MB	16-512 MB	16-512MB	32-1GB

CORPORATE OVERVIEW

DIGITAL EQUIPMENT CORPORATION

Digital Equipment Corporation is amongst the leading companies in the world involved in the development and implementation of client/server solutions for open computing environments. Building on its core competencies in Software, Systems, Networks and Services, Digital - working with its business partners, provide a complete range of information processing solutions from personal computers to integrated worldwide networks. It currently has a product range that gives unbeatable performances in its specific category, be it notebooks, desktops, servers, workstations or networking products.

An international company, more than 2/3rds of its revenue is generated outside the United States. Digital employs over 65,000 people in over 100 countries. It develops, manufactures products and provides customer services in the Americas, Europe, Asia and the Pacific Rim. Its revenues for the year ended June 30, 1994 were US\$ 13.5 billion.

Digital is committed to becoming a truly customer-focussed company and has restructured its sales operations to this end. It is increasingly relying on indirect sales channels such as value-added resellers, independent software vendors, systems integrators and distributors, who are closer to customers and their needs. In addition, Digital today has pioneered the use of the Internet to serve customer needs. It was amongst the first few companies in the industry to use the Worldwide Web to make its marketing information available to customers and prospects. Digital also brings to its customers the entire range of services from consulting and systems integration services to training and multi-vendor customer support.

Annually Digital spends about US\$1.3 billion on Research and Development. Through the new advanced technology group, it continues to explore emerging technologies, the objective being to rapidly transform new technologies into profitable new products, services and businesses. Digital pioneered the technology of 64-bit computing with the introduction of the Alpha AXP 21064 microprocessor. While this chip was the fastest chip in the world, Digital bettered its own record with the introduction of an even faster version of the chip, 21164. The alpha chip currently holds the Guinness World record. Sales of alpha-based products have grown at the rate of 150% over the last year.

Digital Equipment Corporation invests a sizable amount of its revenue each year to broaden and enhance the technology base of Digital India. These vast resources and wealth of technology provide a sound and solid base for the success of Digital Equipment (India) Limited.

DIGITAL EQUIPMENT (INDIA) LIMITED

Digital India is an acknowledged leader in open client/server computing, and its mission-critical attitude aims at doing whatever it takes to help its customers achieve a sustainable competitive advantage through integrated open client/server services and technologies.

Digital India provides the entire range of Digital Equipment Corporation's products and services in India - from System Integration and networking services to software development and multi-vendor customer service capabilities, from intel-based hardware products for personal and mobile computing to the alpha-based high-end products for departmental computing, from workstations to networking components and workgroup computing solutions. Its workstations and servers give the best price-performance in the industry today and it has a significant presence in the Unix market.

Digital India addresses the specific needs of the scientific, educational, technical and commercial sectors; covering small, medium and large enterprises. Incorporated in 1988, Digital India had a revenue of Rs.131 crores in 1993-4. It posted a net profit of Rs.5.91 crores for the half year ended Dec 31,1994, and is currently ranked among the top 7 computer companies in the country. Apart from being technically superior, it has a good customer service record with a growth rate of 34% in the last 6 months. It currently employs over 670 people at 24 locations with over 60% of the total strength being in service and support related functions.

DIGITAL IN PERSONAL COMPUTING

The personal computing line of products were introduced in the year 1993 and right from inception its been a success story. Within a span of two years Digital established itself as one among the top 10 Vendors in the PC World. We have already shipped around 3 Million PCs across the world.

Digital today offers the entire range of Personal Computing products from Notebooks to Desktops to High-end Servers.

Digital India started its PC Business in 1993 and during the first year of operations, 1993-94, we have shipped 2500 units and today we are proudly representing a volume of 7000 nos. We are rated no.2 in the branded PC market. The clientele include corporate giants from various segments of the industry.

With the state-of-the-art manufacturing units spread in 7 locations-across the world, all ISO 9002 certified, Digital PC products have acclaimed international recognition in the global IT magazines like Byte and benchmarking professionals like AIM Technologies, USA.

DIGITAL'S SERVICE OFFERINGS

Digital is strongly committed to delivering the technology and services for the customer need to make itself efficient and competitive in the '90s. It has the best technology to integrate the diverse applications in the enterprise and deliver the solutions that help make our customers more profitable.

Educational Services

The challenge in the fast changing world of information technology (IT) is to be able to keep pace with it; have access to the latest developments; understand them thoroughly and use them to the fullest potential. In this task, the customer needs support from someone who will provide the latest technological updates and help understand their critical impact on your business and organization.

Digital Educational Services is in an ideal position to offer the customer comprehensive training solutions with training centres in 5 locations. Its portfolio of services is addressed at decision makers, solution implementors and users at all levels of management.

The service portfolio consists of:

Training Needs Assessment: Digital consultants will help in understanding the customer's training needs and recommend a training plan.

Training Program Management: Digital can implement organization wide training programs and relieve the customer of logistics and program management responsibilities.

Setting Up Educational Centres: Digital can help the customer design and set up your own educational centre including its fit-up, organizational staffing and business processes, etc.

Individual Learning Centres: In accordance with current trends, Digital can help set up Individual Learning centres geared for learning through technology, at a pace driven by the individual's capabilities.

Customised Course Development: Digital experts can design and develop educational products customized to the need of the customer organization, not necessarily confined to the field of information technology, implemented specifically through conventional or multimedia technology including shooting of custom videos, etc.

Licensing: If the customer's training requirements are large, Digital can license it to provide Digital training to your personnel through your own faculty.

Train the Trainer: Digital can train the customer's personnel to become professional trainers in the generic sense and in specific areas of IT as well for conducting your licensed Digital courses.

Lecture/Lab Courses: These cover extensive classroom and laboratory sessions.

Seminars: Conducted by well known professionals in the field of IT, the seminars address generic issues such as emerging technologies, application issues, management of IT, etc.

Public Domain Courses: These courses are aimed at the working IT professional and are conducted in convenient time slots through Morning, Night and Day schools.

Standard Course Calendars: These are short duration full-time courses conducted regularly by Digital at various educational facilities in India.

Customised Exclusive Training: Digital can deliver any of the courses included in its portfolio in an exclusive package customised specifically for the customer's requirements.

Open Network Services

Digital offers a full range of network services to support the customer's multivendor open network and distributed applications environment. These comprehensive service capabilities include professional consulting, customer training, remedial support, and systems integration services. These services complement and enhance Digital's networking products, as well as support the integration, and management of non-Digital networking components.

Open Network Services address customer's needs for planning, design, implementation and management of the network. The services can be delivered by any of the following methods:

On a consulting basis, whereby Digital will act as an advisor to the customer in planning, designing, implementing, or managing the open network solution, or As a project, whereby Digital will act as customer's agent in planning, designing, implementing, or managing the solution, or as a systems integration effort, whereby Digital will provide not only the services but also the hardware and software components, the interconnections to public or value-added networks, the use of independent consultants (if appropriate), and the program management resources needed to ensure that all goes smoothly.

Planning Services

Digital's Open Network Planning Services will assist the customer in applying networking technology to meet business needs and to address issues associated with designing and implementing an open network solution. These planning services will prepare the customer to transition to an open network environment, while maximizing the use of existing network(s).

Design Services

Digital's Open Network Design Services will assist the customer in designing an appropriate and effective open network solution. This includes providing program management for complex open system design projects and technical resources for distributed application design.

Implementation Services

Digital's Open Network Implementation Services will assist the customer in developing and implementing network applications and in installing Digital's open network software and hardware. Digital will support the customer in developing, implementing, and setting up the open network solution.

Management Services

Digital's Open Systems Network Management Services are comprehensive, tailored solutions that will assist the customer in managing an open system network, to maximize resources and minimize interruption while ensuring efficient Network Operations. The customer can choose between NETsupport Operations Management Service and NETsupport Shared Services, as described below:

CUSTOMER SUPPORT SERVICES

At Digital's Customer Services division, the predominant concern is customer satisfaction through the delivery of high-quality support of Digital hardware and software products. Digital's total support meets customers needs as they evolve from pre-sales network planning to site preparation, computer room design and site services, from system installation and on-site as well as off-site maintenance to future growth oriented network planning.

Digital's Customer Services has been consistently rated the best service provider in India by the Dataquest magazine in its annual customer surveys.

The India Customer Services Management team consists of Corporate Managers of Service Delivery Business, Operations and Administration Support, Logistics and Product Support. The highlights of DEIL Customer Services operations are:

- India-wide support network operating in over 25 locations.
- Fast committed response to service needs.
- Capability to provide 24-hour, 365-day support for mission critical operations.
- More than 150 highly competent engineers. Over 2000 man-years of experience in supporting Digital systems in India.
- Comprehensive preventive maintenance programme for hardware and software.
- Automated call handling and problem escalation procedures.
- Access to worldwide resources.
- Extensive inventory of spares and a sophisticated materials management system.
- Component level trouble shooting centres.
- Commitment to ongoing investment in training and new technologies required to satisfy your needs for innovative, cost-effective and high quality services.

Digital's Customer Services portfolio includes:

- Network & Site Services
- Network Planning & Design Services
- Hardware, Software & Network Installation Services
- System Relocation Services
- Hardware Product Services (HPS)
- Software Product Services (SPS)
- Desktop Support Services (DTS)
- Digital Assisted Services (DAS)
- Digital Customised Support Services (DCSS)

JVC CD-ROM LIBRARY

MC-1200/MC-1600



**This is an Information Library.
Able to Collect, Prepare, and Manage
Expanding data.**

To cope with the new era of the information network, JVC's CD-ROM Library offers:

- Faster access to information
- Increased capacity for data storage

With bigger capacity, quicker access and reliability, JVC has the solution for the new information era.

The JVC CD-ROM Library meets the needs of companies ever increasing requirements for access to information.

	MC-1200/MC-1600		
	Standard	CD-ROM Max. Capacity	CD-R Max. Capacity
CD-ROM	2	6	4
CD-R	0	0	2
Total	2	6	6

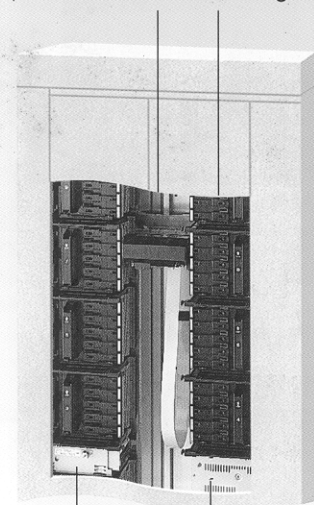
Mail Slot Function

To insert or eject a disc from the front, ensures easy disc management.



High-speed & High-reliability Carrier Mechanism

Ensures faultless working with no errors and fast access to data.
CD-ROM storage from side
(1 removable 50-disc magazine)



MAIL BOX

CD-ROM/CD-R
DRIVE



130GB capacity to meet most of your storage needs.
CD-ROM/CD-R Library of 200-disc capacity model.

MC-1200

Flexible 6 drives configuration.



390GB capacity for maximum storage requirements.
CD-ROM/CD-R Library of 600-disc capacity model.

MC-1600

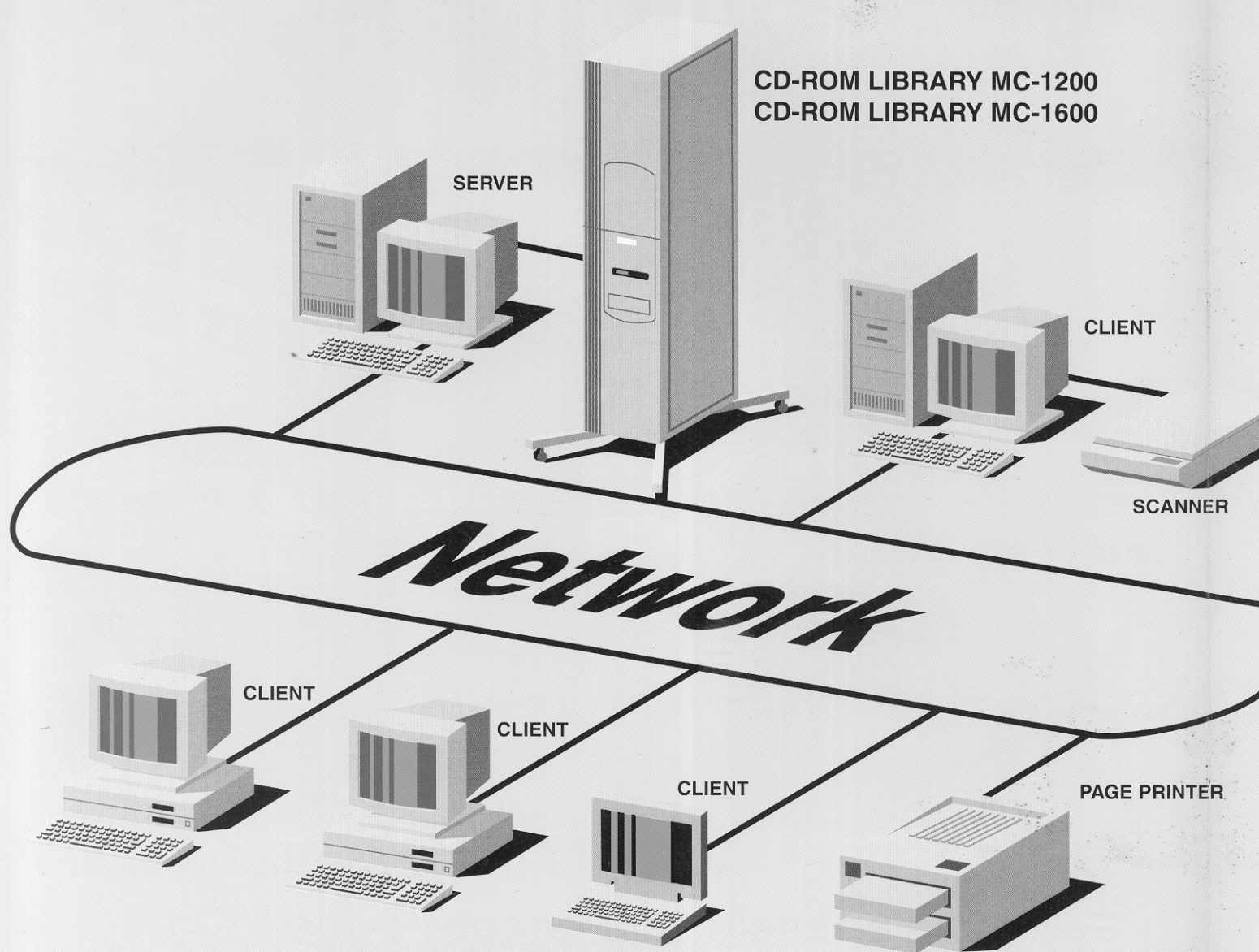
Flexible 6 drives configuration.

Solution

Perfect for all network designs and information requirements, the JVC CD-ROM Library is the most flexible and secure data. Warehouse available.

Data sharing and data management is the key to your success. By connecting the JVC CD-ROM Library to your network you ensures that these two critical items are fulfilled.

Moreover, it can easily combine various applications and also allow for upgradability in the future.



CD-ROM LIBRARY MC-1200
CD-ROM LIBRARY MC-1600

SERVER

CLIENT

SCANNER

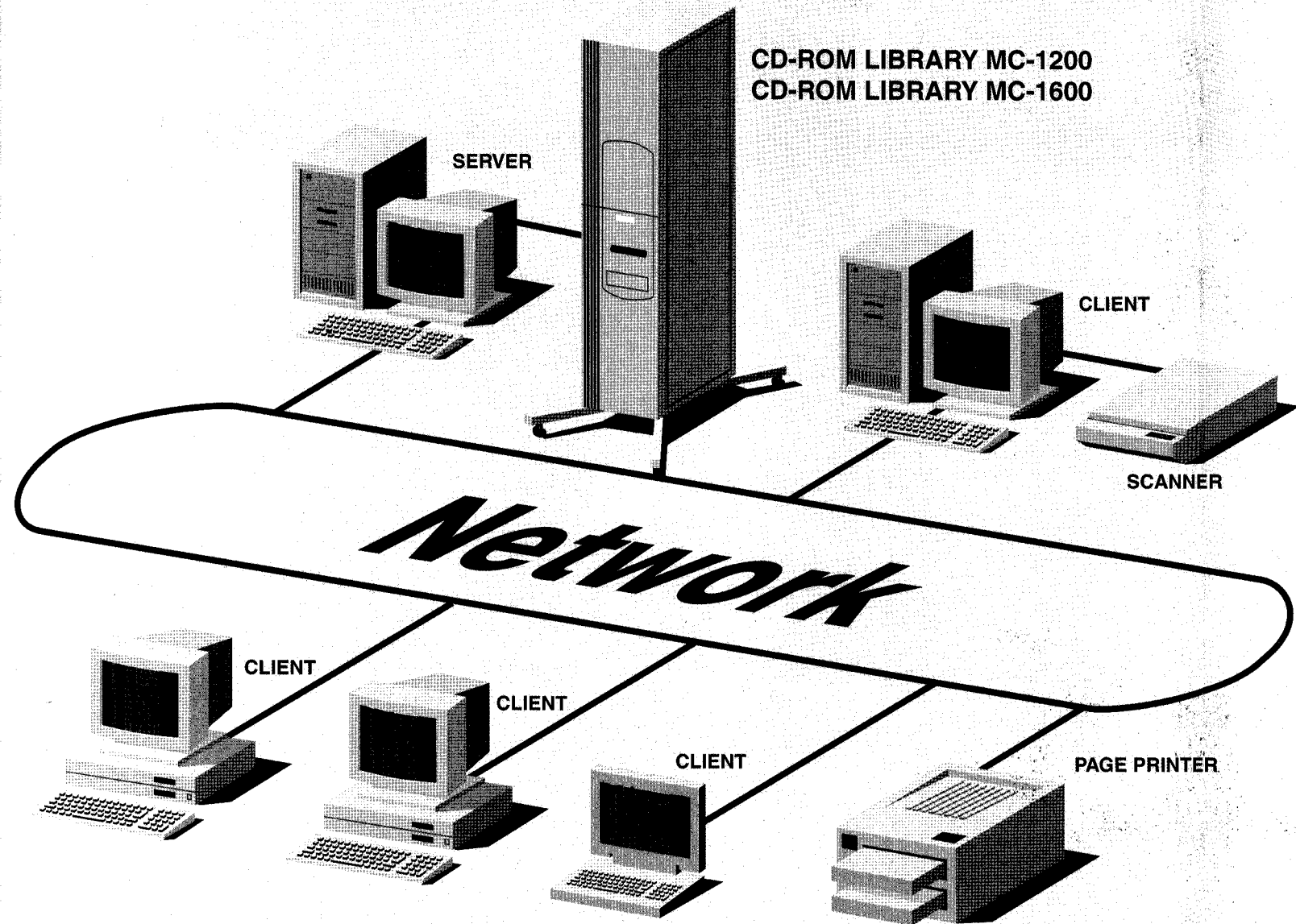
Network

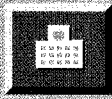
CLIENT

CLIENT

CLIENT

PAGE PRINTER





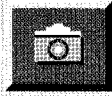
School, Institute, University

Able to search and save large capacity data such as presentations of research results, academy data, teaching materials etc. Effectively saves and manages different kinds of examination questions and data.



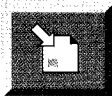
Library, Art Museum, Museum

Not only it is able to save large capacity data, but it can also manage drawings, pictures, photos etc. This multimedia storage ability provides visitors with a more enriching experience additionally standard. CD-ROM's containing B/W programmes may be stored to provide an important software library.



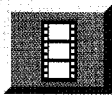
Publication, Production, Media World

Able to manage and store the large amount of image data required. Easy to search or carry the data. Data on line can be retrieved and edited for future business needs.



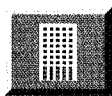
Government Buildings

Able to manage the proposals of resident information, community information, tax collection, patent information, architecture diagrams, and allow for fast search and retrieval. It saves not only a lot of space, but also data for long time use.



Showroom, Events, Shops

Provides for many different multimedia presentations storages that can be played to attract visitors, maintain their interest and sell the companies products.



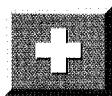
Distribution, Hotel, Insurance

Able to manage and save customers information in a database. Provide storage for video on demand systems.



Architecture, Construction, Design Office

It can save a lot of trouble by storing big maps or diagrams on CD-R. The enormous storage capacity and with the CD-ROM library, a huge numbers of drawing and maps can be easily stored and retrieved.



Medical Diagnosis, Treatment

Able to manage and search image data of medical machines, patients medical records and academic research.



Corporate and others

Able to manage various types of data for development and design, business collection, calculation and estimation reports. Flexible response to the accelerating speed required by a business.

Large Capacity

Two variations of large data saving are available for different uses.

The first is a standard type(130GB) MC-1200 which can load up to 200 discs. The second is a large capacity type (390GB) MC-1600 which can load up to 600 discs. Each one is rated for large capacity in order to meet the needs of different purposes or works.

High Speed

No wait for users, as the speed of data search has been reduced.

With MC-1200 and MC-1600, disc loading time can be performed at an average of 4 to 5 seconds. With quick access, even on the network, users will not feel any anxiety.

High Reliance

Safe management of important data and excellent reliability are guaranteed.

By applying the proven technology of the renowned JVC changer, high-speed changing and high reliability are achieved. The additional security lock system and safety mechanism ensures increased data protection.

Search

Up to a maximum of 6 CD-ROM drives may be included to ensure fast access in response to the network era.

Considering the use for network, a maximum of 6 CD-ROM drives can be loaded and the power of JVC CD-ROM Library is displayed when searching from the network.

Save

Able to write in data, through a central control.

Up to 2 CD-R drives can be installed. Data saving can be done smoothly and managed centrally.

Administration

Easy disc retrieval and exchange from the front mail slot

50 discs are exchangeable by using the magazines. (Regarding the information about MC-M15 magazine set, please see page 6)

Network

Flexible correspondence with network server

A flexible correspondence with all kinds of O.S. network servers, WindowsNT, NetWare, UNIX.....etc.

Fully Loaded with Practical Functions, Multi-capacity Display.

■ Main Feature of MC-1200/1600

Product Name	CD-ROM Library (200 discs)	CD-ROM Library (600 discs)
Model	MC-1200	MC-1600
Disc	200 pieces	600 pieces
Quantity (Max)	130GB	390GB
Disc Load Time	average about 4 seconds	average about 5 seconds
Changing Time	average 8 seconds	average 10 seconds
CD-ROM Drives	standard 2 units (maximum 6 units)	
CD-R Drives	up to 2 units can be installed	
Access Connector	SCSI-2 (centronics 50p) IN. OUT RS-232C(D-sub9P) connector X1 : Remote maintenance	
Disc Exchange	Mail Slot X 1	
Security Lock	(Ordinarily) Installed	
Dimensions	(W•D•H) 360 X 670 X 866	(W•D•H) 777 X 807 X 1641
Weight (disc excluded)	64kg	106kg
Power Consumption	55W	55W

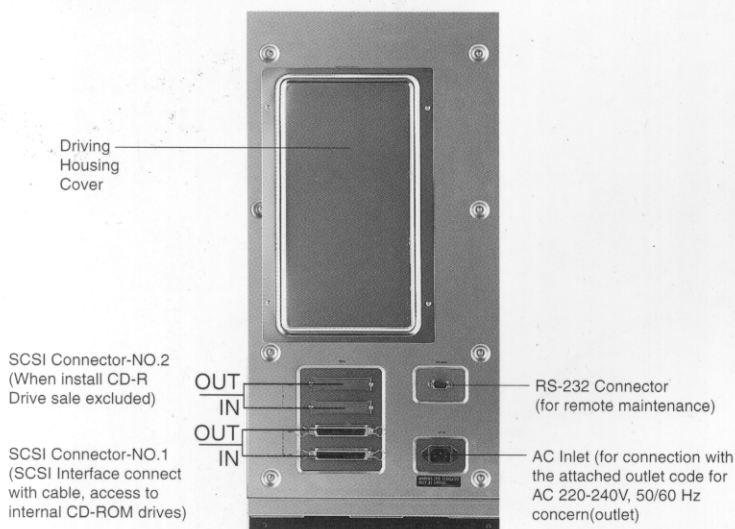
• OPERATION FORMAT

CD-DA, CD-ROM(MODE 1)

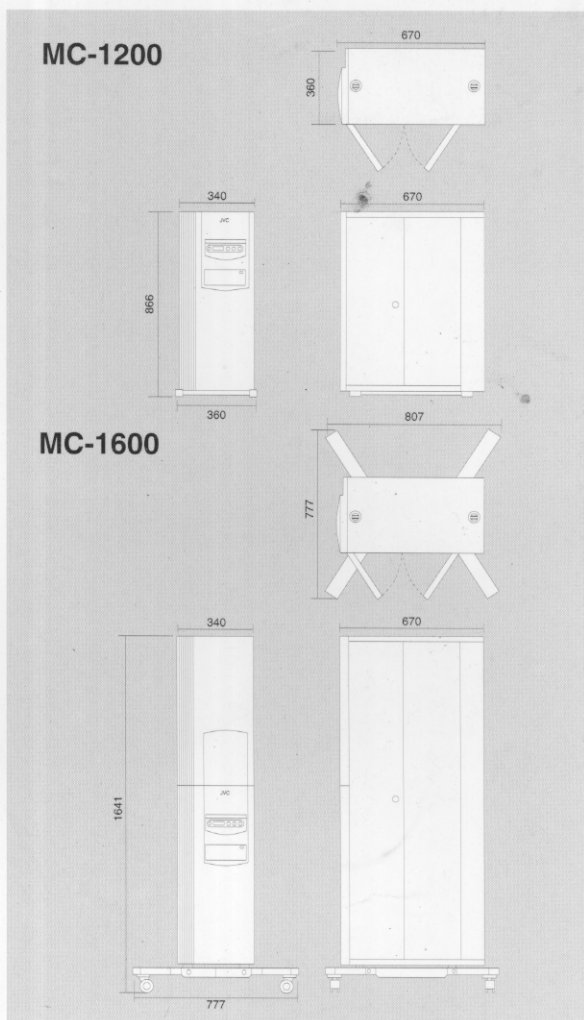
CD-DA, CD-ROM (MODE 2 form1 or form2)

Photo CD, Video CD

■ Back View of MC-1200/1600



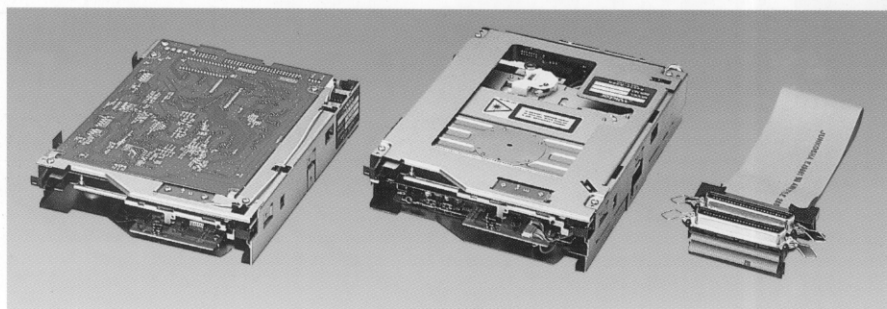
■ Measurement (Unit: mm)



• Design and specifications are subject to change without notice.

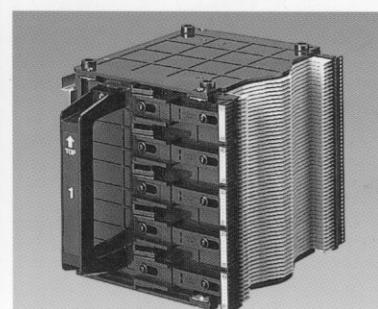
• Due to the printing process, please note that the color of the product in the catalogue may differ slightly from the color of the actual product.

■ Options



8 Times Speed CD-ROM drive
MC-D18

4 Times Speed CD-R drive
MC-R14



Magazine Set
MC-M15



Safety Cautions

- To ensure the sound use of this product, read the "Instruction Manual" and "Safety Information" prior to use.
- Failure to follow safeguards can results in fire, electric shock, or other accidents.

JVC

JVC ASIA PTE LTD

101, THOMSON ROAD, #28-04,

UNITED SQUARE, S(307591)

TEL: 250 6696 FAX: 254 3284

Distributor/Dealer :

1998 Feb

• All company names and products names are registered trademarks or service marks.

THE INSTANT CD / DVD ROM

N E T W O R K I N G S O L U T I O N S



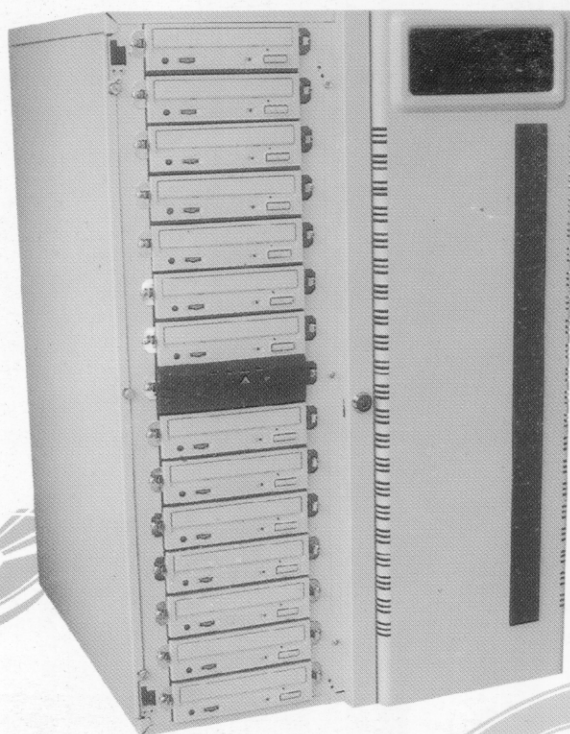
- Easy to install & manage - Plug & Play.
 - File Server Independent.
- High performance SCSI base, expandable upto 28 drives.
 - Internet ready, inbuilt Web Server Technology.
 - Supports multiple protocols and users concurrently.
 - Ethernet and Fast Ethernet Option.
 - Firmware in Flash ROM for easy upgrade.
- Allows management and configuration via LAN or Web.
 - Permits Password Protection.
 - Provides Lockable Tower Cabinet.
- Supports CD Changer and DVD ROM Drives.

Y2K
Compliant

The ValueLine Series

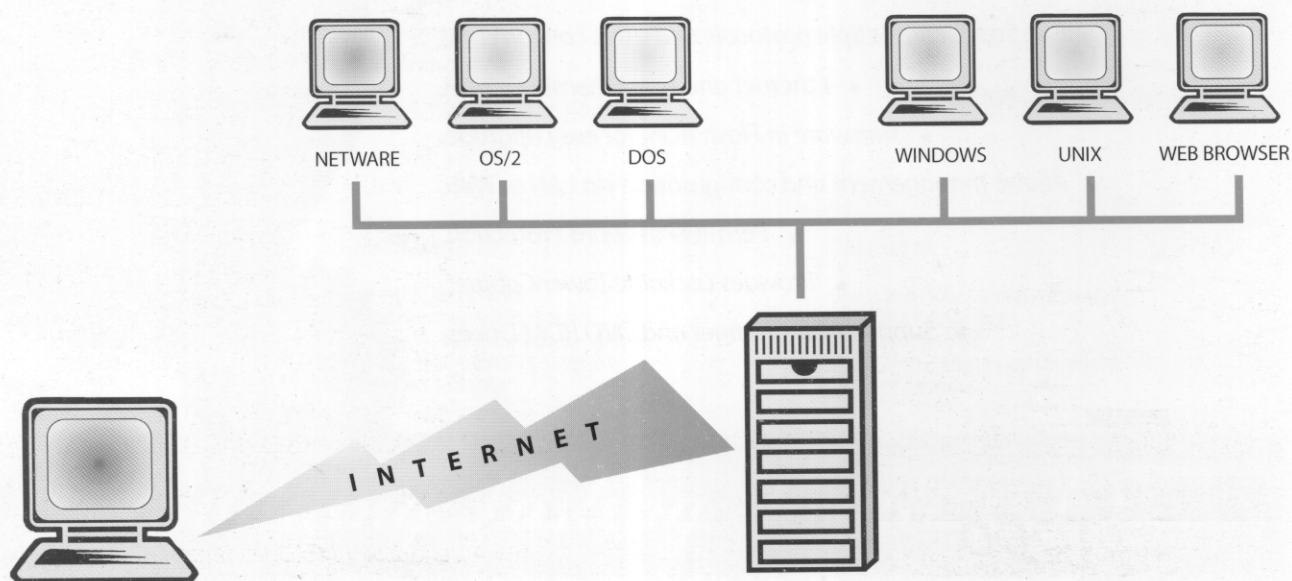
CD-ROM TOWERS

Available in 7, 14 & 28 CD ROM drive configurations, Todd's versatile and affordable ValueLine towers supply on-line access to multiple disc titles. When attached to a network, they increase overall productivity by allowing more than 18 GB data to be shared. In addition they provide simultaneous multi-user access for each loaded disc title and simplify disc management by centralizing all hardware and software in one location. The tower's multiple on-line drives eliminate the need to swap CD-ROM discs, reducing disc handling and increasing the life of your disc library.



The ValueLine series is available with the latest 36X or higher drives with tray loading or caddy mechanisms. Each drive is Photo CD compatible and CD-ROM XA compliant. Features include an external voltage switch to permit operation with 110 or 220 Volts, a SCSI-2 interface, an auxiliary outlet for powering other components, and cooling fans to ensure proper operation temperature. The compact galvanized steel cabinet is ideal for tight space limitations, and the locking front door assures security for your valuable CDs.

The ValueLine towers are compatible with all major operating systems : Novell, OS/2, Windows NT, Windows for Workgroups, DOS, UNIX, Windows 95/98 and others. The towers are available with Todd's Axis Storpoint CD / Web server for plug and play connection to your network. And, of course, the ValueLine towers are backed by our expert technical support team.

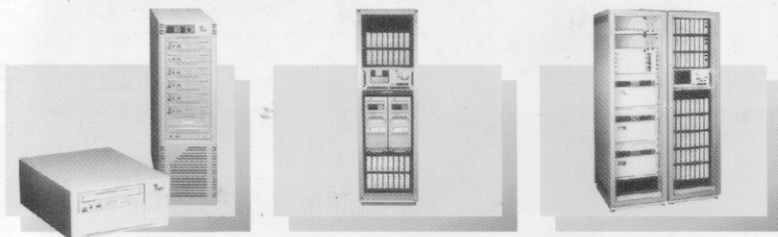


FEATURES & BENEFITS

FEATURES	BENEFITS
● Plug & Play	● Truly Plug & Play. Requires no software on client or file server, hence makes the installation quick and convenient.
● File Server Independent	● The CD Tower connects as a node in Ethernet or as a station in Token Ring network enabling to act as a file server, resulting in high performance and reliability.
● High Performance	● With Ethernet/Fast Ethernet and 36X or higher SCSI CD-ROM drive, access is immensely faster and convenient.
● Network Management & Maintenance	● Permits initialization and configuration by running Axis WinPoint Manager from any workstation under Windows 95/98 or Win NT. Allows easy management and maintenance.
● Web Server Technology	● Built in web server technology permits data access, configuration and management via any web browser.
● Environment	● Operates simultaneously under DOS, Windows 95/98, Windows for Work group, Windows NT, Novell NetWare, Web Browser, UNIX, OS/2, etc.
● Security	● Provides password protection and lockable tower cabinet.
● Upgrade	● Latest software can be directly downloaded to the CD Tower Flash memory over the network using FTP.
● Y 2K Compatible	● The Product is year 2000 compliant.

MODELS & SPECIFICATIONS

MODELS	VALUELINE SERIES CD TOWER
Number of Drives	Available with 7 / 14 / 28 CD-Drives
CD-ROM Interface	SCSI - II
Acceptable Drive Types	CD-ROM (Types - Tray, Slot or Caddy) DVD ROM / CD Changer
Front Panel LED	Power / Network / CD / Status
Compatibility	DOS, Windows 95/98, Windows for Workgroup, Windows NT, Novell Net Ware, Web Browser, UNIX, OS/2 etc.
Protocol Supported	NCP over IPX and IP SMB over NetBIOS / NetBEUI SMB over NetBIOS / TCP / IP NFS over UDP / IP HTTP over TCP / IP
Acceptable Formats	ISO 9660, High Sierra, HFS (Mac Format), CD-DA, CD-ROM Mode 1 & Mode2, CD-ROM-XA, CD-1 Photo CD Multisession
Ethernet Connectors	BNC / UTP / AUI (Choose one)
Power Supply	110V AC and 220 V AC (Dual Capability))



*From imported & domestic parts

Online Systems Solutions

THE TODD ADVANTAGE

Todd Enterprises pioneered CD-ROM development in the mid 1980's, and continues to be a leading innovator in mass storage network solutions. Todd is a major supplier of CD-ROM and networking products to the military, government agencies, corporations, law offices, libraries, publishers and small businesses.

Todd manufactures its own equipment and also integrates the best support equipment from the most prominent manufacturers when assembling customized systems. For specific tasks, Todd partners with ADAPTEC, HITACHI, INTAC SYSTEMS, MERIDIAN, NSM, OPTI-NET, PIONEER, PLEXTOR, SMART, STORAGE, TEAC, TOSHIBA, YAMAHA, AXIS and others to bring you the best solution for your needs.

- Multidrives
- CD - Writers
- Jukeboxes
- Rack-Mount Systems
- Mixed Media Arrays
- Networking
- Customization

GIST SUPPORT

GIST Network Solutions Division will select and integrate a total online systems solution from your existing network. Years of experience with variety of network systems ensure quality products and services.

When you purchase a Todd product, you are investing in the knowledge required to integrate that product smoothly into your existing system and the ability to troubleshoot any problem that may arise in the future.

Whether you are an expert in computer systems and require detailed specifications, or someone needing basic orientation to mass storage systems... GIST can help. GIST takes pride in providing a knowledgeable and friendly customer support staff. GIST end-user support includes guidance in the setup of your system, fully detailed technical manuals with clear, step-by-step illustrations and the availability of training sessions for managing the system being implemented.

Exclusive Distributor in India

**Global
Information
Systems
Technology
Pvt. Ltd.**



Corporate Office

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Haryana - 122 001
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E-mail: gistdel@ndb.vsnl.net.in

* Technical Information in this document is subject to change without notice.

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Fax: 022-5970233

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Phone: 080-5595593, 5595564
Fax: 080-5595564

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Phone: 033-2842111, 2841127, 2841144
Fax: 033-2456846

Building Lasting Relationship...