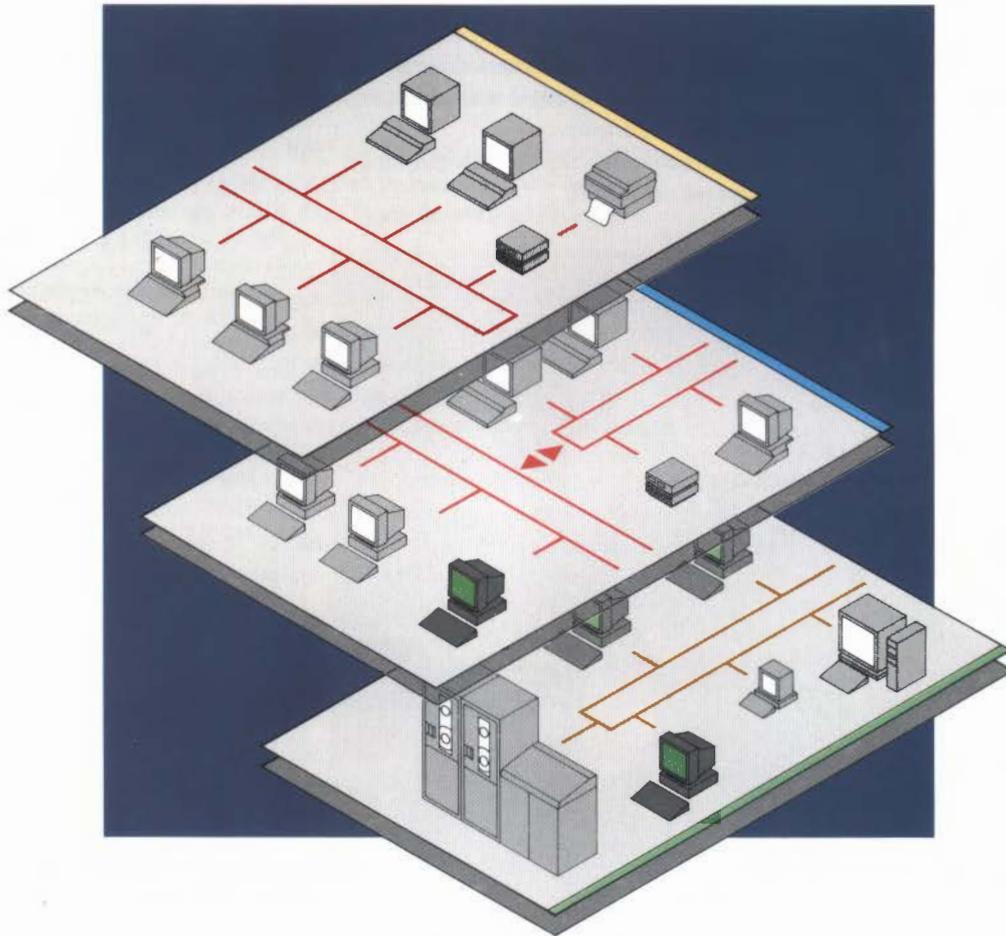# CONNECTIVITY FROM ACORN

Acorn

COST EFFECTIVE DATA COMMUNICATION

The ability for computer installations to communicate with one another, both on local and more distant levels, is becoming increasingly important; not just for large international organisations, but for small work groups which need to share information with one another.

Acorn provides a range of options which can be used to create self contained, low-cost networks or expanded to provide links with industry standard products such as Ethernet.

Econet networks provide Acorn computer users with a cost-effective means of communicating with one another using electronic mail and allow users to access information stored centrally within the department.

Industry standard Ethernet allows users to communicate with a wider range of computers to connect to WANs (wide area networks).

R260

Using the latest version of Acorn's UNIX certified to X/Open's XPG3 Base Profile, the R260 is a 13.5 MIPS workstation which comes with internal SCSI storage, windowing and graphics. The R260 comes equipped to network immediately, because it includes an Ethernet card (supporting thick and thin Ethernet) and software which allows connection to any system using TCP/IP or NFS. (See R260 brochure for full details.)

THE ARCHIMEDES RANGE

The Archimedes range of computers, including the BBC A3000, was designed to use the phenomenal power of Acorn's RISC processor to make the whole system easy to use. It combines the visual, intuitive way of working that newcomers take to so readily, with a speed of execution that experienced users appreciate. In addition, the Archimedes 400 and 500 series computers can be fitted with a low cost Econet module or an Ethernet card (supporting thick and thin Ethernet) to enable them to be used on Econet or Ethernet networks.
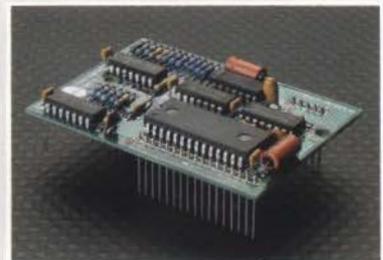

MASTER 128

The reliability and versatility of this low-cost Acorn computer is well known. Widely used in schools all over the world it has also found diverse applications in many areas outside education. All it needs to connect it to an Econet network is a simple-to-install Econet module.

THE ECONET MODULE

The Econet Module enables your Acorn computer to use Econet facilities. Requiring no soldering or complicated connection methods, it can be fitted in a matter of moments. The same Econet Module is used across the Acorn range of computers.

THE SMALL GROUP NETWORK

EFFICIENT DATA STORAGE
Networking not only allows users to gain rapid access to data held by other users, but also eliminates the need for each computer to be fitted with independent large storage devices. The work group shares central storage facilities thus eliminating duplication of data and enhancing co-operation and communication within the group.

ARCHIMEDES LEVEL 4 FILESERVER This suite of software transforms any RISC OS machine into a fileserver that, can be run as a multi-tasking desktop application or as a stand-alone server. Print spooling and Network Management tools are also provided.
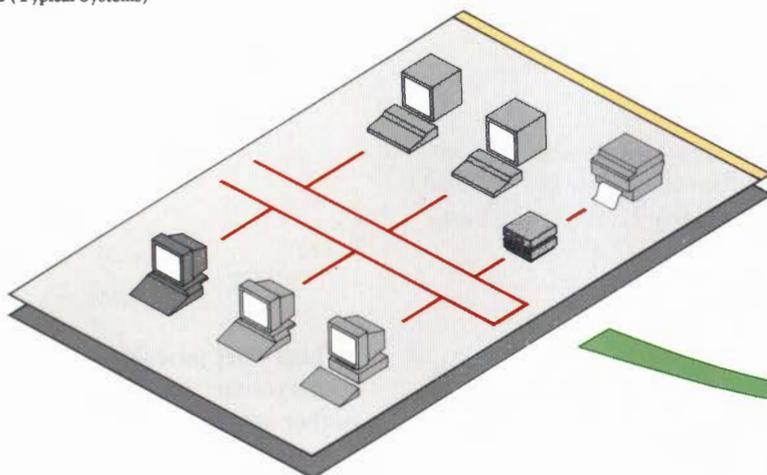
CENTRAL PRINTING The Level 4 Spooler also provide shared access to printers. This means the user can control the printing of a document from his or her own workstation – even if the printer is located in another part of the building. There is no longer any need for workstations to have their own printers or for work to be stored on floppy discs so it can be sent to the nearest convenient printer when hard copy is needed.

SYSTEM SECURITY In most organisations, it is usually necessary to limit access to certain types of information to particular departments or individual users. Econet networks are designed to allow easy access to those directly involved in particular types of information, whilst preventing other system users from gaining entry to sensitive files. At the same time, some users, such as system supervisors or chief executives, can be given unlimited access to all information held on the system if required.

GETTING STARTED A small Econet network can be created very easily and cost-effectively. You may choose between a portable installation, where the network only needs to cover 20 metres, or a more permanent installation where the network may extend for up to 500 metres. A comprehensive guide is included with each Econet system sold, enabling fast and trouble-free installation.

Using the connections and cables provided, the computers can be joined together without any specialist expertise. As your needs grow it is advisable to make a permanent installation using an Econet Starter Kit. With this system, sockets and terminator boxes are permanently mounted to suitable surfaces to provide a network which is both efficient and unobtrusive. Computers can then be plugged into the network at any socket.

See table (Typical Systems)

NETWORKS IN USE

CLASSROOMS
All programs and exercises can be stored centrally and made available to all network users. The need for staff to spend valuable time searching for software can be reduced.

SCHOOLS
By networking around the school, information and resources can be shared widely. The network can also be used to help manage pupil access to Information Technology resources across the whole curriculum.

OFFICES
A simple Econet network can be used in any office environment where small groups of people work closely together in the same building, for example a small business, a doctor's surgery or the accounts department of a larger business. With the Econet system, users are able to exchange files, drawings, memos and other documents without leaving their desks.

LABORATORIES
Econet users can access the results of a range of different experiments and incorporate them into their own work. The Econet system is also used as the basis for highly reliable and cost-effective process control systems.

TRAINING CENTRES
Where computers are used to train people it makes sense to make the computer equipment as easy to use as possible. Using Econet networks, individual trainees need neither floppy discs nor disc drives so are able to concentrate on the educational content of the program rather than on how to use the computer equipment.

EXTENDING THE NET

JOINING SMALLER NETWORKS TOGETHER As the needs of the organisation grows, the network can be extended to meet them. Small

networks are joined together using Bridges. These provide high speed automatic connection between separate Econet networks ensuring areas of heavy network traffic are separated from each other to maximise network performance. One of the advantages of joining networks together in this way is that if one section of the network fails, the rest of the Econet system is not affected.

The introduction of a number of further Bridges increases the possible layouts to meet most needs, thus providing fast, reliable network services which are both flexible and economic.

Econet networks are designed to link together different models from the Acorn range of computers. For example, if you already have Master 128s they can share the same network as the more advanced Archimedes, BBC A3000 and R260 models. The Archimedes system is particularly suitable where users require exceptional processing power and the R260, being a UNIX-based computer, can make use of a vast library of industry standard software such as accounting packages, databases and so on.

As your needs become more sophisticated, and you begin to acquire more powerful computers, like R260s, you may wish that your Master 128 users could have access to similar facilities. Special software is now available which allows Master 128s to be used as terminals to R260s providing access to multi-user databases, office automation products and financial services software.

NETWORKS IN USE

WHOLE SCHOOLS
As more departments in a school build up their use of computers, the network can be adapted to fit the need. Computer rooms and small clusters of computers can become individual networks, all connected to an Econet backbone.
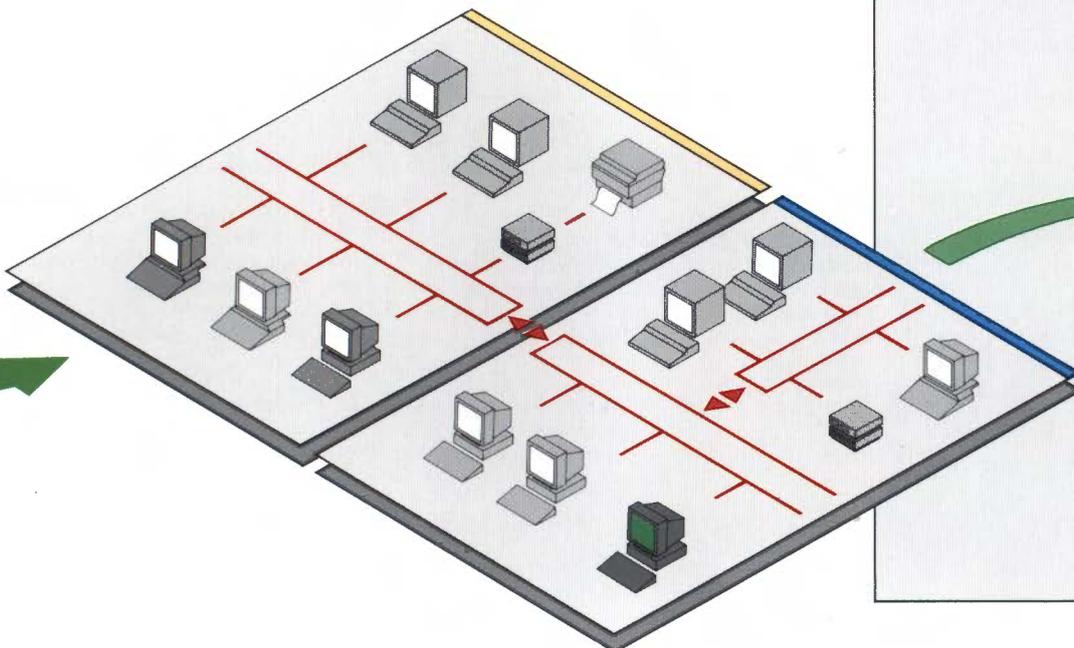
FACULTY
On a small group network it is only possible to monitor the work carried out in the group. By extending the network to cover the whole faculty, the results of different groups can be brought together. In this way, Econet systems can help to foster co-operation between separate departments.

BUSINESS
One thing all offices share is that the people working in them all rely on information collected or created by other people in the business. Marketing departments need information from sales, production, distribution and finance departments; order processing departments need information from sales and distribution departments; and finance departments need information from all parts of the business. By joining small group networks any departments can gain access to the information it needs to conduct its business without having to track down the individuals responsible for it.

INDUSTRY
By using computers close to the manufacturing process it is possible to gather essential management information which, using an extended network linked to separate departments, help to increase business efficiency. Networks not only speed up the information gathering process, they also help to promote communication between different departments and sites.

WORKING WITH INDUSTRY STANDARDS

In organisations where Ethernet has already been adopted as the network standard, significant cost savings can be achieved by using Econet networks to expand parts of the system.

Using Acorn's versatile R260, which can plug into both Econet and Ethernet networks at the same time, the two systems can be made to work together. On the Econet network, the user can run Master 128s, Archimedes and R260 computers together – the number and choice of computer will depend on the work carried out. The R260s on the Econet network will be able to communicate with R140s, and R260s, and any other UNIX-based computers on the Ethernet network. (The R140 or R260, which is connected between the Ethernet and Econet networks, provides an internet routing service between the two.)

Where Acorn users wish to take advantage of industry standard software packages designed for UNIX, they can simply add a number of R140s or R260s to their existing Econet network. They thus have the advantage of UNIX without losing the advantages of the computer systems with which they are most familiar.

The UNIX-based machines are an excellent choice of computer where both local and wide area communication is required. At a local level, the R series connect to both Econet and Ethernet systems allowing the user to benefit from a low-cost Econet system plus high-performance Ethernet networking. In this way an R140 or 260 could provide a link with other high-performance UNIX workstations on the Ethernet part of the system. In addition, the R260 can be connected via the Ethernet to routers and bridges providing a link with wide area networks and allowing communication with other networks located thousands of miles away.
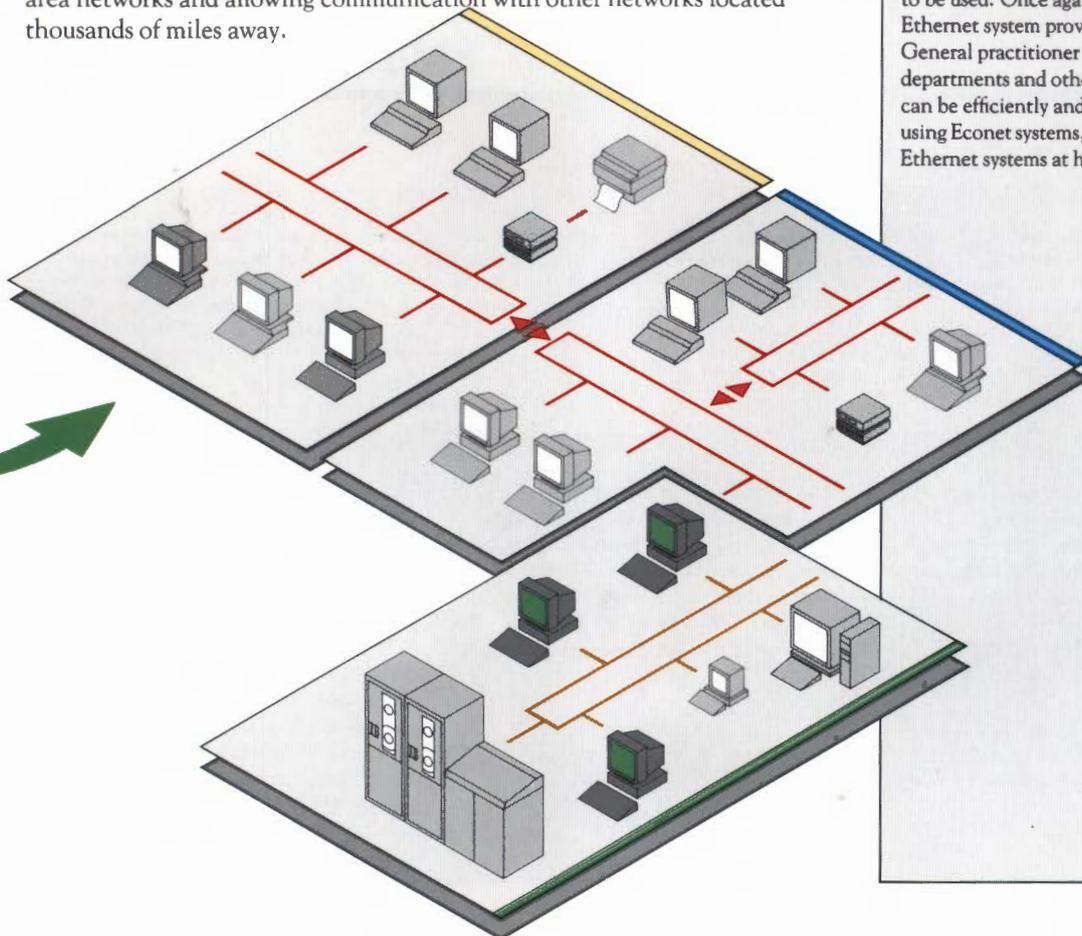
NETWORKS IN USE

TERTIARY EDUCATION
Many educational establishments are planning to extend their existing computer investment and/or to link into industry standard networks. In addition some departments use a range of equipment including that manufactured by Acorn. In such cases an Econet/Ethernet link is the natural development. This provides the flexibility and compatibility of industry standard systems plus the power, price and performance of Acorn systems.

CORPORATE ORGANISATIONS
Econet networks can also provide an extremely cost-effective solution for the large corporate which has, or needs, an industry standard infrastructure but, for reasons of economy, prefers to use Acorn equipment in selected departments. Thus a number of departments can each have their own Econet network linked to the corporate Ethernet systems. Econet network users can share information within the department and Ethernet users can have access to it.

LOCAL AUTHORITIES
In government departments large volumes of complex information need to be handled in a cost-effective manner. Communication between separate departments normally means that industry standard technology has to be used. Once again, a mixed Econet/Ethernet system provides the solution. General practitioner units, small departments and other parts of the authority can be efficiently and cost-effectively run using Econet systems, which can be linked to Ethernet systems at headquarters buildings.

TECHNOLOGY FOR THE FUTURE

Acorn's strength in research and development is renowned throughout the industry. As well as its own computers, it has designed its own RISC technology which has become one of the world's leading RISC architectures.

The company supplements its own knowledge and expertise by maintaining strong links with Cambridge University. It also recognises the potential for computer communications in the future and devotes considerable R&D resources to this vital area.

OPEN SYSTEMS (OSI) STANDARDS

The purpose of OSI development is to enable computers of different makes and types to communicate effectively with one another. The advantage of OSI is that users will be able to buy different computers from a selection of manufacturers to perform a wide variety of tasks, secure in the knowledge that they will all be able to communicate with one another.

Acorn's R&D department keeps abreast of all these new standards and protocols and designs products to make sure its customers' existing investment in Acorn equipment is enhanced as new technology is introduced. As part of this programme, the department is continually working on the latest protocols. This means users of Acorn products will be able to take full advantage of the new technology as it is introduced.

JOINT ACADEMIC NETWORK (JANET)

Universities in the UK are linked via a wide area network known as JANET. This network is administered by the UK academic Joint Network Team (JNT). The JNT have specified the protocols and services to be provided over this network in a number of documents which are known collectively as the 'Coloured Books'. Work has been done to develop the software providing these Coloured Book services on the Acorn R260. In addition the JNT has

published plans for the transition between the use of coloured book protocols and the use of OSI protocols in the academic community. Acorn continues to study these issues and maintains close contact with university departments that are developing communications software for use on the JANET network.

Acorn

For further information contact your local dealer, for a dealer list, please contact:

Acorn Computers Limited
Fulbourn Road, Cherry Hinton
Cambridge CB1 4JN England
Telephone (0223) 245200
Telex 817875 ACORN G
Fax (0223) 210685
Viewdata (0223) 243642

SUPPORT

ECONET USER GROUP
All Filestore purchasers are eligible for membership of the Econet User Group. The User group publishes a quarterly newsletter reviewing new products and detailing how particular users are operating their Econet systems.

MAINTENANCE AND SUPPORT
The Acorn R140 comes complete with a 12-month support package which includes on-site hardware maintenance, telephone hotline assistance and diagnostics, warranty and free incremental software updates as released. Maintenance and support of Econet systems can be provided by Acorn's network of specialist Econet dealers.

SPECIALIST DEALERS
A number of Acorn's dealers have been specially trained in the use and installation of Econet networks and/or trained in UNIX systems. For a list of these specialist dealers, please write to Department DL, Acorn Computers Limited, Fulbourn Road, Cherry Hinton, Cambridge CB1 4JN.

TRAINING
Acorn's training centre at Cambridge offers monthly courses on the use and management of Econet networks. For further information, please contact: The Training Administrator, Acorn Training Centre, Cambridge Technopark, 645 Newmarket Road, Cambridge CB5 8PB.

SUPPORT INFORMATION DATABASE (SID)
Subscribers to SID can obtain technical support, free software, and electronic mail communication with Acorn staff and other SID subscribers. This 'electronic user group' features a number of bulletin boards on which subscribers are invited to 'post' problems and solutions. The scheme is already used by the Schools Service and by a growing number of independent users. For further information, please contact: The Support Information Services Manager, Acorn Computers Limited, Fulbourn Road, Cherry Hinton, Cambridge CB1 4JN.

OTHER GROUPS
Acorn participates in a number of other interested groups including the Common UNIX Environment (CUE) Project. This is an independent trade association set up to promote Open System standards within the European Information Technology Community. It provides a useful forum for the exchange of hardware and software technology between its members, and a collective and common approach into the standards making organisations. CUE is leading the way in demonstrating systems that conform to GOSIP standard.

SOFTWARE LICENCES
Acorn offers site licenses for all Archimedes computer software titles except for games. These site licences cover use on both Econet network and on stand-alone Archimedes computer systems. Most Master 128 and Master Compact software titles are available in site licensed versions.

TYPICAL SYSTEMS

A network inside a single room:
- 10 Acorn Archimedes computers
- 10 Econet modules
- 1 Archimedes 440 or 540 computer with Level 4 Fileserver software and
- 1 Econet module

OR
- 1 E01S Filestore with
- 1 E40S Filestore
- 2 10-station lead sets
- 1 printer of your choice*

A network up to 500 m in length:
- 20 Acorn Archimedes computers
- 20 Acorn Master 128 computers
- 40 Econet modules
- 2 Archimedes 440 or 540 computers with Level 4 Fileserver software and
- 2 Econet modules

OR
- 2 E01S Filestores with
- 4 E40S Filestores
- 5 100 m reels of cable
- 1 Econet starter kit
- 16 socket packs
- 2 printers of your choice*

A network with Master 128 computers acting as terminals to an Acorn R140 UNIX system:
- 1 Acorn R140 base system
- 8 Acorn Master 128 computers
- 9 Econet modules
- 1 100 m reel of cable
- 1 Econet starter kit
- 2 socket packs
- 1 Ecoterm package*
- 1 printer of your choice*

A network of Acorn R140 UNIX workstations on an Econet network (for 5 stations):
- 5 Acorn R140 base systems
- 5 Econet modules
- 1 10-station lead set
- 1 Econet starter kit
- 1 printer of your choice*

A network of Acorn R140 UNIX workstations on a Cheapernet (thin Ethernet, 10base2) network (for 5 stations):
- 5 Acorn R140 workstations which includes five Ethernet cards
- 4 3 m Cheapernet cable with connectors*
- 2 Cheapernet terminators*
- 5 Cheapernet "T" pieces*
- 1 printer of your choice*

A network of Acorn R140 workstations on an Ethernet (10base5) network (for 5 stations):
- 5 Acorn R140 workstations which includes five Ethernet cards
- 5 Ethernet AUI cables*
- 5 Ethernet transceivers*
  Ethernet backbone cable and terminators*
- 1 printer of your choice*

A typical campus network:
- 10 Acorn Archimedes 410 computers
- 10 Acorn Archimedes 440 computers
- 30 BBC A3000 computers
- 30 Acorn Master 128 computers
- 3 Acorn R140 base systems
- 83 Econet modules
- 3 Archimedes 440 or 540 computers with Level 4 Fileserver software and
- 3 Econet modules

OR
- 3 E01S Filestores with
- 6 E40S Filestores
- 12 100 m reels of cable
- 4 Econet bridges
- 5 Econet starter kits
- 2 printers of your choice*

*Third party products.
Computer systems do not include monitors.
Please contact your supplier for further information.

SPECIFICATIONS

ECONET

Network:
Type: CSMA/CA
Topology: Bus
Speed: Baseband 250 kbit/s
Maximum single network length: ½ km
Maximum number of stations per network: 254
Maximum number of interconnected networks: 127

Module:
The Econet module is an internal upgrade which may be fitted inside any of the following Acorn products: the BBC Master range, the Archimedes range and R140 workstations. It provides the network interface hardware required to connect these machines to an Econet network. Software is included on ROM for the BBC Master range. The modules is fitted with an HDLC driver, transmission, receiver and collision detection circuits. Collision avoidance is managed by network software running in the host machine.

Level 4 fileserver software:
Software which allows a RISC OS machine with backing store to be used as a fileserver, it comes complete with Network Management and Print Spooler software.

Cable:
Dual twisted pair
Characteristic impedance 100 ohms + 10%
DC resistance 27 ohms per 500 m per core
Mutual capacitance <66 pF/m
Propagation speed >0.5 c
Connection by solderless IDC sockets, 180 degrees 5 pin DIN

Bridges
L 350 mm, W 206 mm, H 72 mm
2 MHz 6502 Second Processor
Dual Econet interface
Self-test mode
INCLUDES:
2 connecting leads
Installation guide

Filestore E01S
Two 3.5 inch floppy disc drives with 1.2 Mbytes of storage
Filestore fileserver software on EP ROM
Parallel printer interface
Filestore expansion bus
Econet interface module
Econet clock and termination circuits
Real time clock unit and RAM maintained by rechargeable battery
Switch mode power supply
Comprehensive documentation

Filestore E40S
One 40 Mb hard disc drive
Switch mode power supply
Filestore expansion bus socket

Ethernet Expansion card
Single Eurocard suitable for use in Acorn R140
10 base5 (Ethernet) AUI interface
10 base2 (Cheapernet/thin Ethernet) interface
Conforming to IEEE 802.3

Econet 10 Station lead set
11 Econet 'T' connectors
10 Econet cables (1 m)
Sufficient to connect 10 Econet stations

Econet starter kit
Econet clock box and power supply
2 Econet terminator boxes
3 Econet socket boxes
Cable insertion tool
Installation manual
Suitable to connect up to 8 Econet stations
Econet socket box pack
5 Econet dual socket boxes

Printer Spooling*
Software which allows information sent for printing to be placed in a 'queue' and handled in sequence.

Backup*
Hardware which allows data from hard disc to be 'backed up' on digital magnetic tape for archive purposes

ETHERNET

Network:
Type: CSMA/CD
Topology: Bus
Speed: 10 Mbps
Maximum coaxial cable segment length: 500 m (thick Ethernet) with up to 100 transceivers per segment
Maximum station separation: 2.5 km

UNIX Communications:
TCP/IP with Berkeley networking commands uucp, telnet, ftp, smtp, Kermit
NFS 3.2, Yellow Pages

Ethernet:
Combined expansion card with both Ethernet and 'thin' Ethernet/ Cheapernet, compatible with IEEE 802.3

Ecoterm*
Allows Master 128 computers to be used as terminals to UNIX-based R140 computers.

Ethernet transceivers*
Interface between thick Ethernet cable and AUI cable.
Ethernet bridges, gateways and relays*:
Available from a wide range of suppliers, these are used to extend Ethernet systems either across campus or as wide area links.

*Third party products.
Please contact your supplier for further information.