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Authors: MN-S and CAS

Purchase and Installation of a simple AUN Network

This document will provide the reader with sufficient information to allow them to construct a simple Ethernet based network using RISC OS machines and the AUN/Level 4 Fileserver software.

It is, however, beyond the scope of this document to cover all aspects of Ethernet design and installation. Those readers who seek information on more complex network topologies should refer, in the first instance, to the documentation supplied with the AUN/Level 4 Fileserver.

Applicable Hardware :	All Archimedes machines. All Ethernet cards fitted with an AUN Boot ROM.	Related Application Notes:	Optimising AUN Network performance.

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Support Group
Acorn Computers Limited
Acorn House
Vision Park
Histon
Cambridge CB4 4AE

1 Introduction

This note is intended to give guidance to anyone wishing to purchase and install an AUN Network. It is designed for those that have not attempted such an exercise before, and concentrates on straight forward, simple networks. It does not attempt to cover issues such as connection with other network types, for example Econet, Nexus or non-Acorn systems. Likewise it is beyond the scope of this document to discuss issues surrounding the use of more complex topologies involving Gateways, Bridges or Repeaters. To address these the reader should contact a suitably qualified professional network installer and/or read the manuals supplied with the AUN/Level 4 Fileserver.

2 First steps

A network is a means of connecting two or more computers together in order to allow them to share resources and communicate. The current Acorn networking model is called Client-Server. Clients are machines that require services such as file and application access or print services. These machines are generally distinct from those that provide these services (servers).

A small network may consist of one machine that acts as a file server and print spooler that is dedicated to this purpose and a number of machines that can utilise the services that it provides. There are restrictions of course regarding numbers of clients that can be sensibly accommodated by a server, and these are discussed in the following pages.

Installing a network first involves ensuring that:

- the correct hardware is available in all participating machines
- the physical network is correct and working
- all machines are correctly configured
- the server software is installed

All these steps will be covered in some detail. Some background information on Ethernet, which is the technology described in this note, is given in Appendix A. This document deals with Thin Ethernet, as this is the type that is supported by all types of Ethernet card for RISC OS machines. Here are some statistics:

Maximum length of one cable segment: 185 metres

Maximum number of stations on a segment: 30

It is important to note that the 185 metres includes *all* the cabling - including drop cables, if used.

There are two main ways to install the cabling for a network. The simple way is to run the cable as a "daisy chain" from machine to machine, using "T-pieces" to connect the cable to a network card, as shown in the diagram overleaf.

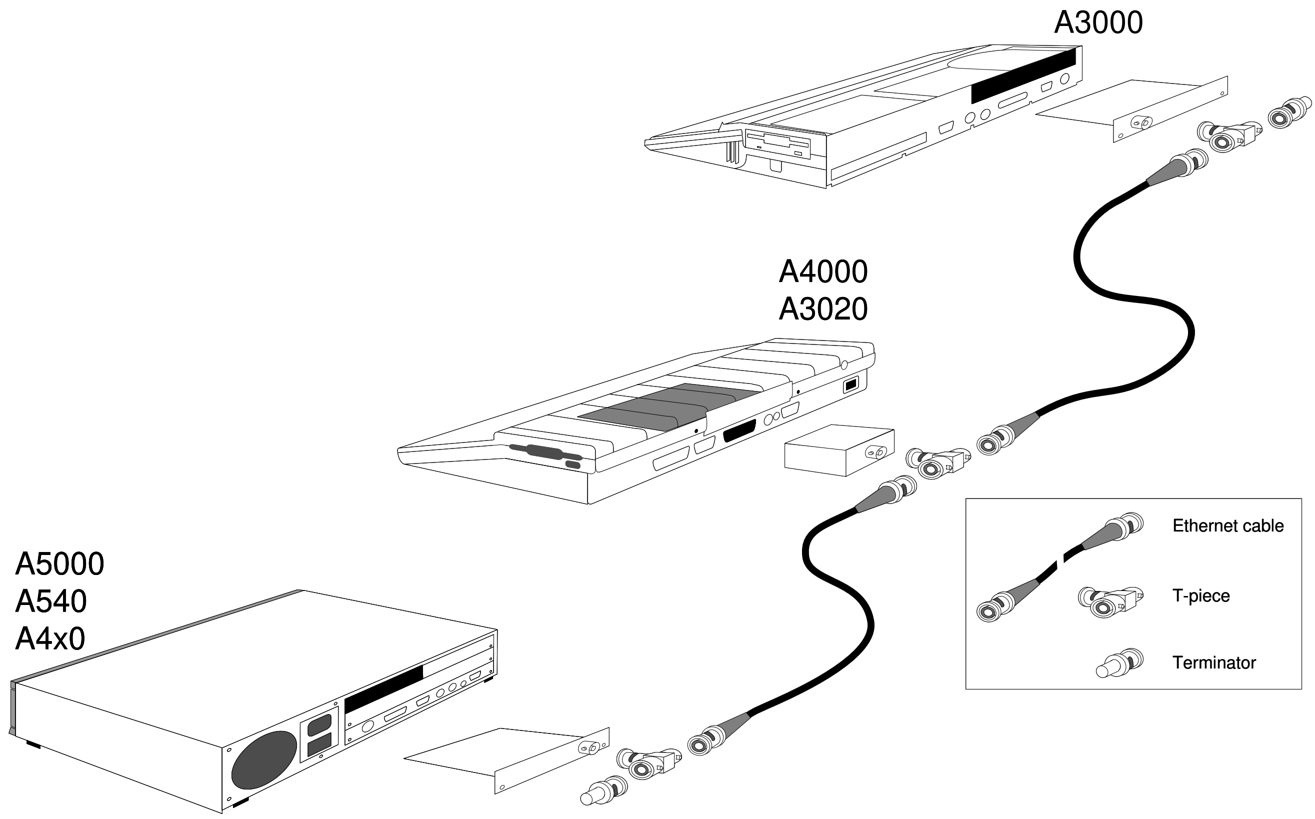


Illustration of a typical Thin Ethernet (10Base2) network and its component parts.

There is nothing wrong with this sort of network. It is ideal for non-permanent installations, and the connectors that attach the bits of cable together (BNC Connectors) are well engineered and do not come apart accidentally. But it is possible that they can be detached, breaking the continuous cable run and therefore bringing the whole network down.

For more permanent installations, a socket-box approach is preferred. Here again, there are two main choices. They can either be simple, just consisting of two BNC connectors that run down to the machine and back, but which require a "short linking cable" between the BNC outlets on each unused box, and the more expensive "make before break" box which allows the station to be disconnected without bringing the network down. These two types are also illustrated below:

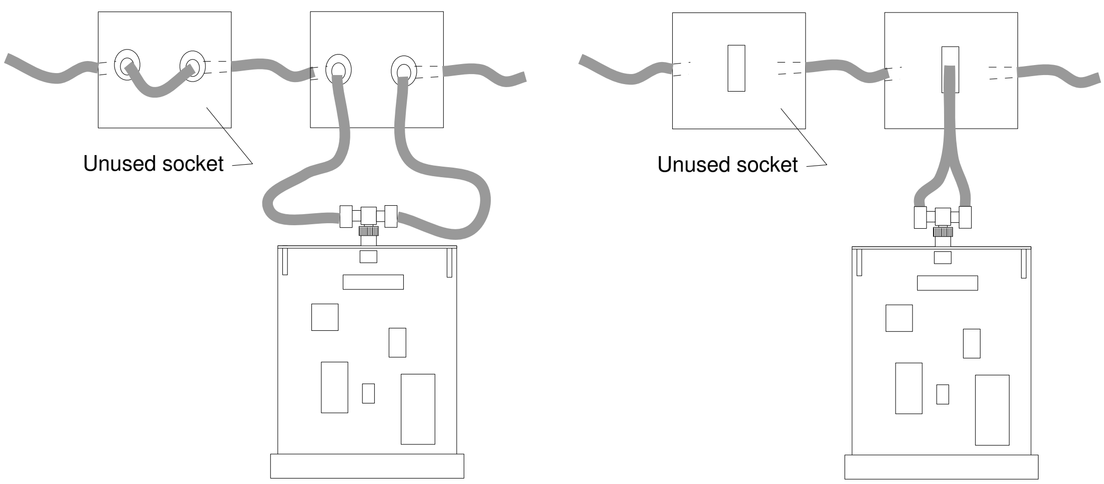


Illustration showing some Ethernet 10Base2 connection methods.
An "unprotected" BNC system is shown on the left whilst a protected "make before break" solution is shown on the right.

3 Obtaining the components

To use Ethernet you need RISC OS 3.1 or later in every machine. Each machine must have an Ethernet card fitted. These are available from a variety of sources, but different cards are required for different machines. Prices may vary from third party suppliers, and it is possible that quite considerable discount may be given for quantity. At the time of going to press the following information is believed to be correct:

Platform	Supplier (Sales Code)
A5000, A400 Series	Acorn (AEH54) Atomwide Risc Developments (4600e) Oak Solutions
A3000 (A3020 A4000)	Atomwide Risc Developments (4601e) Oak Solutions
A3020, A4000 (Network slot)	ICubed (Isolan) Risc Developments

Check with the supplier that the Ethernet card contains the AUN client software. (Some cards are available with different software loaded).

Cables, T-Pieces and Terminators can be obtained from a variety of sources. One well known supplier is Pronet - a list of sutiable components is shown below:

2 Metre drop cable (BMM58/2)
Twin 2 metre cable (BGM/2) (Includes T-Piece)
T-Piece (35031)
Terminator (35098/50R)

There are a number of companies that specialise in Ethernet boxes, trunking, make-before-break connectors etc, but these lie outside the scope of this document. Refer to your local dealer for information.

4 Fitting the network cards

When your cards have been purchased, plug them into the machines as per the manufacturers' instructions.

Ensure power is switched off and the mains plug is removed from the socket before removing covers or inserting cards.

Connect the machines via the BNC connector on the Ethernet card to the network. Ensure that the network has a terminator at each end of the cable (as shown in the earlier diagram), and that it forms a continuous run of wire with the Ethernet card BNCs tapping off the cable.

5 Configuring machines

With the machines powered up, it is necessary to configure the machines to set their station number and load the Ethernet software from the memory on the Ethernet card. If the machines have no hard disc of their own, you may wish to boot them from the fileserver at power up. This is covered later in "Hints and tips".

To ensure that the correct Ethernet software is loaded, ensure that the machine is switched on and is displaying the normal desktop. Press **F12**. At the * prompt type the following command:

```
*Configure BootNet on
```

When you have done this press **Return**. Now reboot the machine by pressing the button marked **Reset** whilst holding down the key marked **Ctrl**.

Take a floppy disc with the *SetStation* utility on it (for example the Level4 Fileserver application disc). Insert the disc into the machine that is going to act as the fileserver (ie one that has a hard disc) and then:

- Click-select on the floppy disc icon
- Double click-select on the *SetStation* program
- Type `254` at the prompt.
- Reboot the machine.

This process will set the station number of this station to 254, which is the customary number for a fileserver. Repeat this exercise at every other additional machine on the network. Ensure that you choose a different and unique number for each one. It is recommended that you start at say 20, and then go up in units of five or ten.

The machines are now ready to talk over the network.

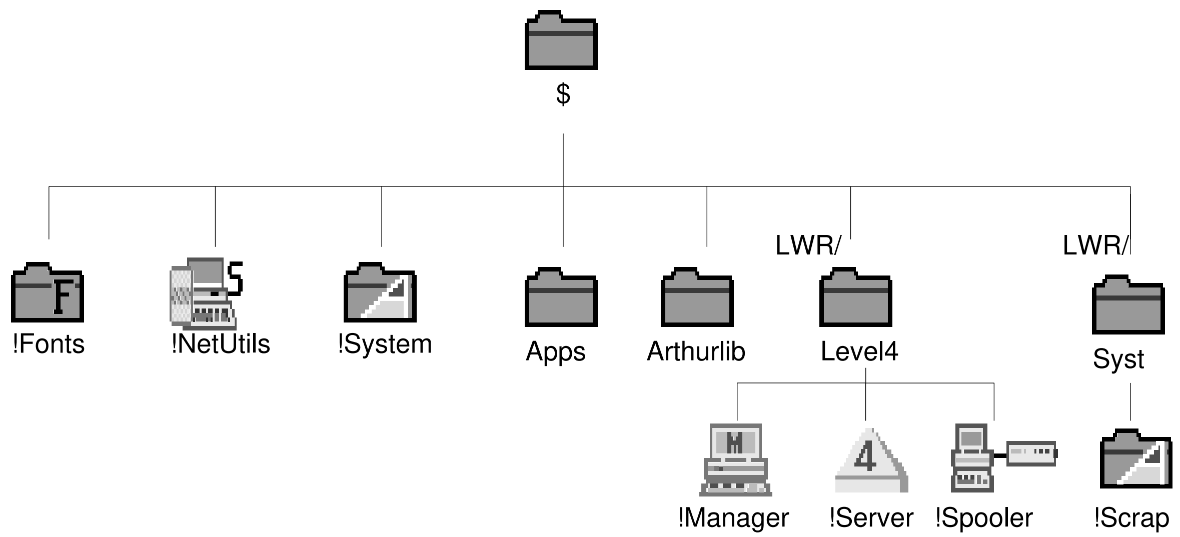
6 Installing the Fileserver

The Level 4 Fileserver manual contains a great deal of advice on setting up a fileserver, and there is no substitute for taking the time to read through it carefully. If you know that your fileserver will be doing a number of the following :

- have to handle hundreds of users
- be accessed by more than six machines at any one time for intensive tasks
- be used for application serving
- does not have a normal ADFS hard drive (or a standard IDE drive as per the A5000 et al)

then you are strongly advised to read the manuals supplied with the AUN/Level 4 Fileserver software. However, if you are setting up a fileserver which will only be accessed by a small number of users for saving their own data then you may take some short cuts.

Make sure that the root directory ($) of the hard disc is not littered with applications and resources. Ensure that files are grouped in a reasonably tidy and logical manner; this will make it easier for other users to find things on the fileserver. Create a directory structure on the hard disc which matches the one in the following illustration.



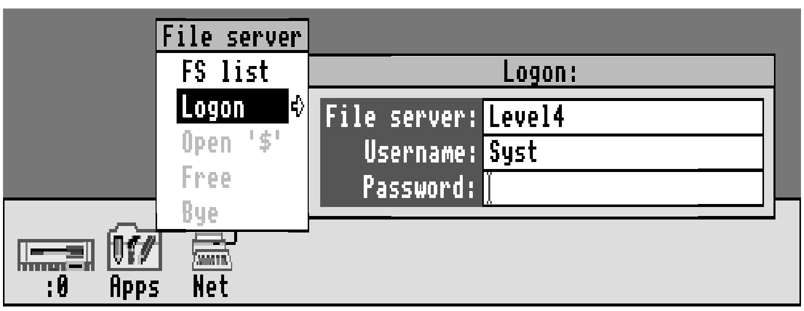
Level 4 directory structure.

As you become more experienced with the management and use of the fileserver you may wish to change this structure, but for the time being it is important that you copy this structure exactly. You can find copies of these applications on either the Level 4 Fileserver disc or the applications discs supplied with the machine.

Create a directory called *Syst* and copy *!Scrap* into it, this will be needed when you logon as a system privileged user to perform day to day management tasks.

Name the hard disc with a name that you want it to be seen as over the network. Something inspired like *Level4* will do, but not *%^&76*! Disc names of 10 characters or more in length are best avoided at this stage, as their use requires changes to be made to the exports file in Level 4.

Double click on the *!Server* icon, when the pyramid icon is displayed on the icon bar your server is running. You should be able to move to another station and click-menu over the **Net** icon on the Icon bar, move to the Logon box and logon to the fileserver. Type the name of the fileserver disc on the top line, Syst as the user name - no password is required, just hit **Return**.



Performing a Logon from a client station to the fileserver.

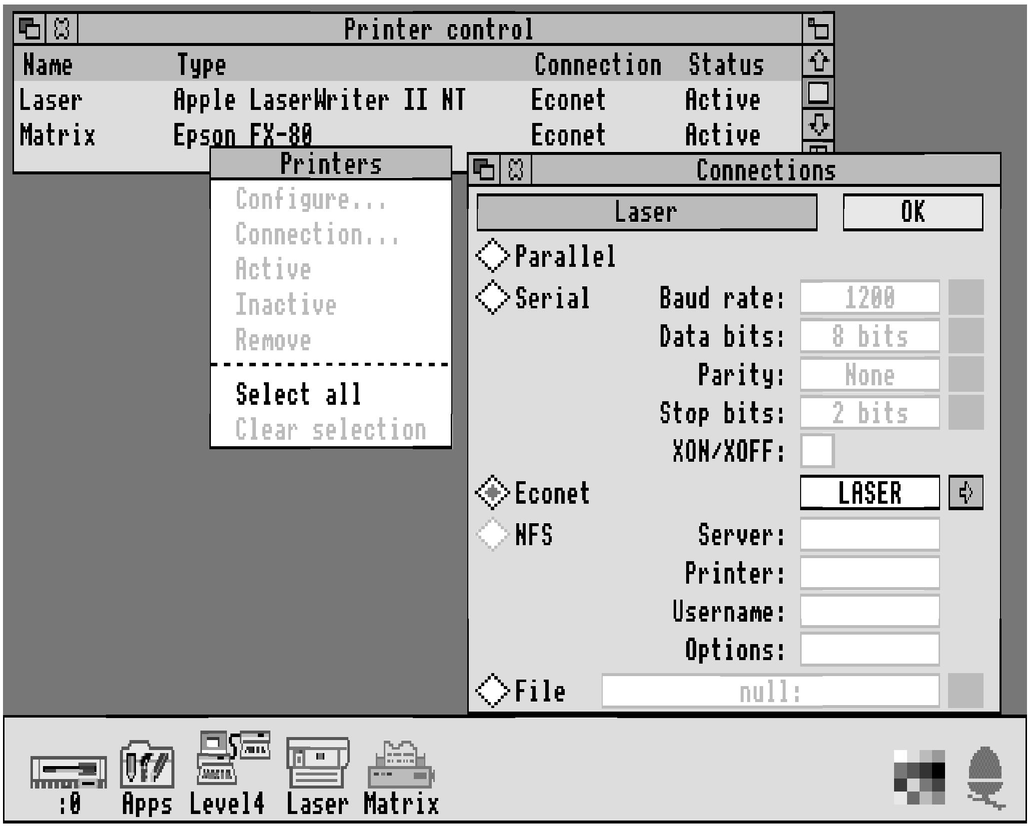
A filer window will open, showing the contents of the directory *$.Syst*. To access the whole of the disc, move the pointer over the **Net** icon on the icon bar click once on the menu button and click-select on **Open '$'**. A filer window will open, showing the root directory of the fileserver, and you can share this data as if it were your local hard disc. Refer to the *Level 4 Fileserver Managers Guide* in conjunction with Section 8 of this document if you wish to restrict user access to the fileserver disc and Section 9 if you wish to set up !ArmBoot files for users.

7 Installing the Spooler

You may wish to share a printer between the machines on the network. This can be done with the *!Spooler* application. Firstly, attach the printer to the machine - it can be any machine on the network but you are strongly advised to ensure that this machine has its own local hard disc which contains the copy of *!Spooler*. Where the number of hard discs on the network is limited it might be sensible to connect it to the machine that is acting as a fileserver, and reserve this machine as a dedicated resource.

Double click on the *!Spooler* application, and then click-select on the **Spooler** icon on the Icon bar. This will open up a window with two printers displayed; **Matrix** and **Laser**. In this default configuration, **Matrix** is configured to print to the **Parallel** port, and **Laser** is configured to print to the **Serial** port. You may copy or delete these printers, or alter the connections by menuing on the printer icon and setting them up as required.

On a client machine, load a copy of *!Printers* (either from local disc or from the network fileserver). This note assumes familiarity with this application, and that you can set it up with the correct printer definition file. If you are unsure how to do this then please refer to the section on *Printing* in the *RISC OS User Guide*. The setup sequence is shown in the illustration below. Click-menu on the **Printers** icon and click-select on the **Printer Control...** box. Click-menu again on the appropriate printer and select **Connections...**. In the Connection box click on the **Econet** button (yes, **Econet**!), and select the printer name from the associated menu window. Save the options, and you are now ready to print.



<u>Illustration showing how to configure !Printers for Network use.</u>

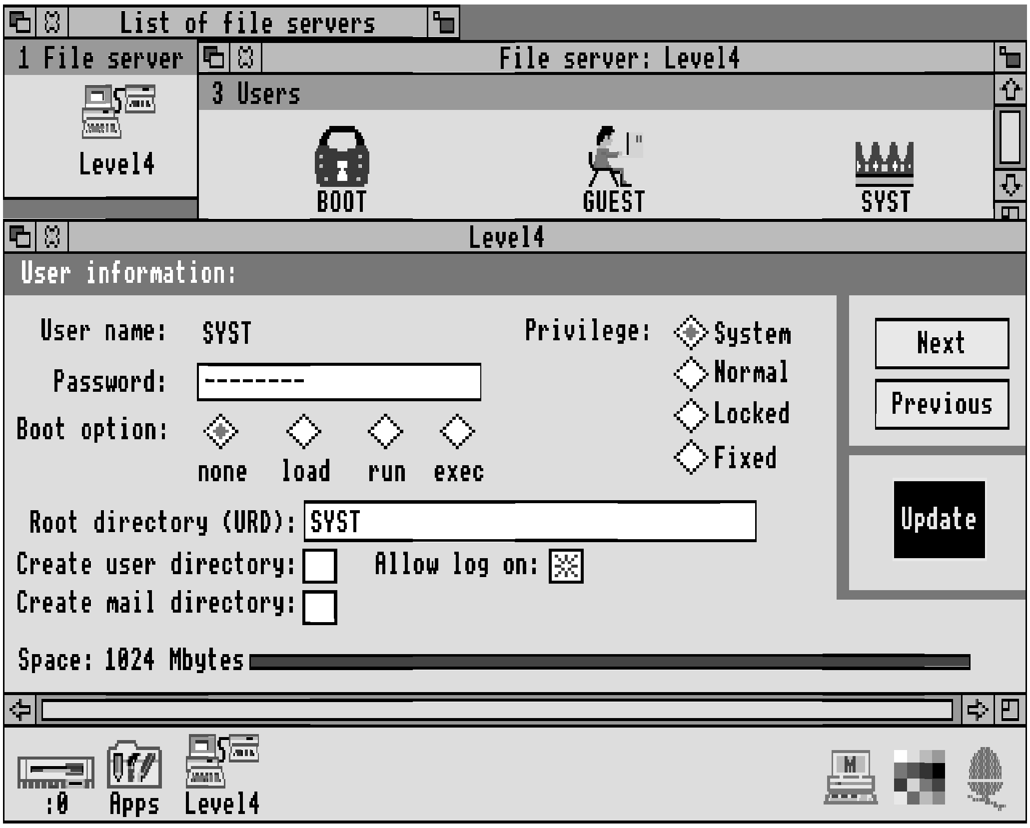
8 Using the system - Users & !Manager

As described, you can log onto the fileserver as user "Syst". This user has special privileges, one of which is "ownership" of all the fileserver disc, and can therefore be rather dangerous. It is wise to add a password to the system user. This password ***must*** be kept a closely guarded secret. It is also desirable to create other "users" of the system who can have access to just those areas of the fileserver that they need. For these operations, you need to use *!Manager*.

You may use !*Manager* on the station that is acting as the server, but not whilst the server is running. It is strongly recommended that you use it on one of the client machines connected to the network.

Load *!Manager*, and click-select on its icon on the Icon bar. After a pause, a window will open with a display of all the Acorn fileservers available on the network. In this single-server network there will be either one or two servers - shown by the disc name, or "**local server**" if you are running manager from the server machine. Selecting this fileserver will open a window with all the users in it: Syst, Guest and Boot.

Click-select on Syst, which opens the "profile" for this user. Enter a suitably secure password (minimum 6 characters, max 21), and click-select on **Update** as shown below.



Setting the password for the user "Syst".

You may wish to create new users, which can be done intuitively via the **Users** window, but do refer to the Level 4 manual for a full description. If you produce a user called, for example "Class1" or "JSmith" and then click on **Create User Directory**, then click on **Update**, it will produce what is called a "User Root Directory" or "URD" for that user. This means that if that user logs onto the fileserver as "Class1" then the directory viewer seen is the Class1 directory (which will be empty, of course) This is the starting point for this user on the fileserver, where private data and applications can be safely kept.

If you have decided to enable the Space Accounting feature of the fileserver (available from the icon bar set-up menu) then you may use *!Manager* to assign appropriate space to each user, simply by dragging the **Space** slider on the user profile window. Space accounting is set on by default.

9 Tuning the system - !ArmBoot files et al

It is often a very good idea to ensure that machines, when they are switched on, log onto the fileserver automatically and load the required system resources. These resources include *!System*, which hold copies of additional modules which may be required by applications, *!Fonts* which holds fonts that are not in the RISC OS ROMs and *!NetUtils*, which ensures correct network operation. To do this, it is necessary to create a small *!ArmBoot* file, which is an obey file that is run by a machine when it logs onto the fileserver.

Start **!Edit** on the Server machine and create an **Obey** file. Into this obey file type:

```
*Rmreinit BroadcastLoader
*Unplug BroadcastLoader
*Desktop -f Deskstart
```

and save this file as name *!Armboot* in the root of the fileserver disc, ensuring that its access has been set to Public Read (WR/r). It is important to disable Broadcast Loader, as it adversely affects the performance of Ethernet networks!

Next create a **Text** file and type into it:

```
*Filer_Boot Net:$.!System
*Filer_Boot Net:$.!Fonts
*Filer_Boot Net:$.!NetUtils
```

and save it under the filename *Deskstart* in the root of the fileserver. Ensure that it also has its access rights set to Public Read. (Note. In the example shown above full pathnames; Net::Level4.$.!System, could have been used for each file in place of Net:$.)

Now using !Manager, open up the profile for the user Boot, and make sure it has the boot option set to **Run**. Next visit each client station that you wish to boot automatically and press **F12**. At the * prompt type:

```
*Configure boot
*Configure filesystem net
*Configure FS 128.254
```

and then reboot the machine. It will then log onto the fileserver as user **Boot**, run *!System*, *!Fonts* and *!NetUtils*. This will save a lot of time on a busy network as it will ensure that the machine performs the minimum of operations when the user logs on by his or her user name.

For printing, or moving data between applications, the RISC OS machine needs to have access to an application called *!Scrap*. This application holds temporary data during these operations. It is advised that a copy of *!Scrap* is copied off the Level 4 applications disc into the User Root Directory of each user, so that they each have access to this resource.

The appropriate use of *!ArmBoot* files can greatly enhance the service provided to the users of the network. It is possible, with boot files, to arrange for the root directory ($) to be automatically opened and for certain applications to be already loaded when a client logs onto the fileserver. This involves the use of another *!Armboot* file, that this time exists in the Users Root Directory (URD). An example might be:

```
*Filer_OpenDir Net::Level4.$.Apps
*Run Net::Level4.$.Apps.DTP.!EasiWrite
```

Again, save this **Obey** file in the User Root Directory, and ensure that the user has the boot option set to **Run**.

10 Hints and tips

You may run the Server in the desktop, but you can also run it in standalone mode. Running the fileserver in this way usually results in a 25% improvement in file loading time. However, in this mode you cannot utilise any other application, for example **!Spooler**, on the same machine.

In the desktop, in order to ensure the best possible performance, it is advisable to select the lowest possible resolution screen mode available - 12, 11 or even 0. Do not have the **Status window** open unless you really want to monitor requests to the fileserver.

A sensible number of client machines to support at any one time might be 15, as this number is known to provide acceptable performance in the vast majority of circumstances. As circumstances change this figure may need to be revised. It is worth noting that some applications naturally load more slowly than others on a network, due to the number of files that are accessed during the course of loading them. As a rough guide, Impression should load to 10 stations in around 2 minutes, and many popular applications are signficantly faster than this.

You may wish to start the server automatically on power up. To do this, it is suggested that you use the !Boot file that comes with the product, but if you are adventurous, it is not difficult to write your own, or to utilise the desktop boot facilities provided by RISC OS 3.

Appendix A: Ethernet types

Ethernet is a world-wide industry standard which is supported by most computer manufacturers. Because it is an industry standard, it means that equipment from a variety of different manufacturers can coexist on the same network, even if the software cannot understand the messages produced by other machines! Ethernet comes in three flavours: "**Standard Ethernet**" or 10Base5; "**Thin Ethernet**" (sometimes known as Cheapernet) or 10Base2; and "**TwistedPair Ethernet**" or 10BaseT.

Standard Ethernet is very expensive, requiring thick Coax Cable and expensive connection outlets to each machine. It is often used for backbone networks.

Twisted Pair Ethernet is used predominently in offices. In this system, each machine has its own private wire to a "hub", where signals are amplified and broadcast to all other machines.

Thin Ethernet is the most popular form of Ethernet, and is especially suitable for schools. It is a "**Bussed**" network using cheap coax cable, and cheap connections to each machine.

A **Bussed** network means that the network consists of a long cable that starts at one **terminator**, snakes its way past every machine on the network, and ends at another **terminator**. All flavours of Ethernet run at the same speed; 10 Million bits per second (10Mbps). The difference between standard ethernet and thin ethernet is the maximum permitted length of a single piece of cable, and the maximum number of stations that can be connected to one piece of cable, or "segment".

Appendix B: Addresses

Atomwide 23 The Greenway Orpington Kent BR5 2AY Tel. 0689 838852 Fax 0689 896088	**Pronet Dataparts** Unit 6 The Galloway Centre Hambridge Lane Newbury Berkshire RG14 5TL Tel 0635 31045 Fax 0635 528219	**Oak Solutions** Suite 25 Robin Enterprise Centre Leeds Road Idle West Riding West Yorks. BD10 9TE Tel 0274 620432 Fax 0274 620419
I3 (ICubed) The Paddocks Cherry Hinton Road Cambridge Tel 0223 413717	**RISC Developments** 117 Hatfield Road St Albans Hertfordshire AL1 4JS Tel 0727 840303	