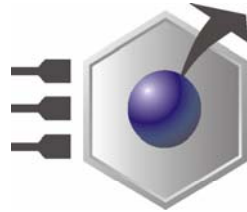


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ALPHABOX: Boot from network using Linux

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Conventions

The following table lists conventions used throughout this guide.

Icon	Notice Type	Description
	Information note	Important features or instructions
	Warning	Information to alert you to potential damage to a program, system or device or potential personal injury

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Chapter 1 Foreword and requirements

When you purchase an Alphabox system it comes without any operating system installed. In order to start working with your system the first operation is to perform an Etherboot (boot from network) operation.

This Application Note describes how to perform a **network boot** operation using Linux.

The term *network boot* refers to the possibility, for every Alphabox system (configured as Client device), to download a Linux kernel from another Computer on the network (Server).

In order to do that a program called **Etherboot** has to be used by the Client (Alphabox) while the **DHCP** and **TFTP** services will be required by the Server.

Once the kernel is loaded and executed, the server - using the NFS service - will make the **root file system** available.

DHCP (Dynamic Host Configuration Protocol) is a protocol used for the assignment of dynamic IP addresses to devices on a network.

TFTP (Trivial File Transfer Protocol) is a simple form of the FTP protocol often used by servers to boot diskless workstations.

NFS (Network File System) is a client / server application that allows access to shared files stored on computers of different types throughout the network.

Hardware requirements

In order to perform a boot from network you need:

- An Alphabox with the following connections available:
 - An RS232 serial port coming from the internal CPU module (usually available on the M2 connector)
 - The network port coming from the internal CPU module (usually available on the M1 connector)
- A standard computer provided with:
 - A 10/100 Mbps Ethernet interface
 - A RS232 serial port

This PC will be the *network Server*

- A serial null-modem cable (with the TX and RX signal crossed) and with the RTS and CTS signals shorted together on one side (connect this side to the Alphabox). This is the same cable used to perform a Virtual Peripheral (or VT100) session and described in the CPU module manuals when the feature is available. Please refer to the appropriate manual for the CPU Module integrated into your Alphabox for further information.

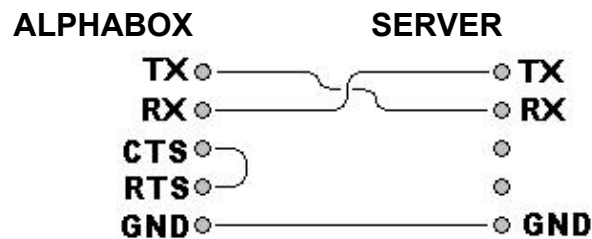


Figure 1. The VT100 connection

- A cross-over network cable or two standard network cables and a 10/100Mbps switch (or hub)

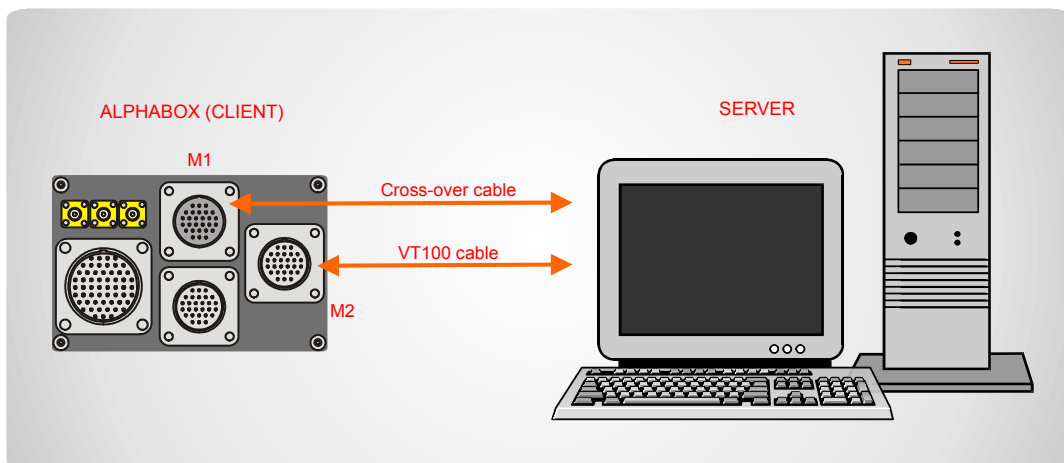


Figure 2. The network boot connection

Software requirements

This paragraph highlights the most important steps for correctly configuring the software that will allow you to a boot from network using **Etherboot**.

Further information about Etherboot can be also found on the Internet.

Alphabox (the Client)

The Alphabox system comes with the Etherboot program already configured for performing a network boot (refer to [Chapter 3](#))

The Server

Kernel for the Alphabox

The kernel that will be loaded through the network in the Alphabox has to be compiled according to the CPU and Add-on modules installed in your Alphabox.

The downloadable kernel image is generated by the **mknbi** utility

Root file-system for the Alphabox

In a boot from network the root file-system is usually mounted through NFS.

For this reason it is necessary that the configuration scripts do not refer directly to hardware devices.

For example a file of this kind: */etc/fstab*

```
Proc / proc proc defaults 0 0
/dev/hda1 / ext3 defaults,errors=remount-ro 0 1
```

This would not make sense unless the kernel is loaded through the network while the root file system is stored in the Alphabox disk.

The DHCP, TFTP and NFS services and their configuration

As previously described, in order to perform a network boot, you will need the DHCP, TFTP and NFS services to be running on the Server.

For configuring the DHCP, TFTP and NFS services please refer to the relative documentation (i.e. man pages). You can also refer to the documentation contained in the Etherboot files downloadable from the Tools section of each CPU module in the Download area of the Eurotech web site: <http://www.eurotech.it/main/downloadnfe.asp>

Terminal emulation program

You will need a terminal emulation program to be running on the Server. It will allow you to have access to the Alphabox console.

The terminal emulation program has to be configured for *VT100 emulation* with the serial 19200 8N1.

Once the Alphabox is turned on and after the initial BIOS screenshot the Etherboot menu will be displayed.

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Chapter 2 Performing the boot from network

These are the steps to follow in order to perform a boot from network:

1. Connect the Alphabox to the Server using the VT100 and Cross-over network cables
2. Turn on the Server and make sure the DHCP, TFTP and NFS services are running
3. Run the VT100 Terminal emulation program
4. Turn on the Alphabox (The Etherboot program should start automatically)
5. The Etherboot console will be displayed on the Terminal program of the Server
6. Press the 'N' key (or wait until the automatic timeout occurs) in order to activate the boot from network procedure
7. When the boot from network procedure ends the Linux kernel will be running on the Alphabox.

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Chapter 3 Appendix

Settings of the CPU Setup

Available settings for all the CPU models

The Alphabox comes configured with a BIOS Setup ready for the boot from network.

In order to access the BIOS (i.e. for changing its options) it is necessary to press the “F2” key in the VT100 Terminal emulation program during the initial boot sequence of the Alphabox.
For further information you can also refer to the specific CPU Module user’s manual

Regardless of the CPU module installed the correct BIOS settings should be:

- In the **General** page the **Boot Try Sequence** must be set as **NET/FD1/HD1**
- In the **Devices** page the **Boot Network Adapter** must be set as **Enable Device and Firmware**

Settings available for the CPU-145x models

When using a CPU-145x the following BIOS settings should also be applied:

- In the **ISA BUS** page the **Memory at 0E0000h..0E3FFFh** must be set as: **PCI BUS**
- In the **ISA BUS** page the **Memory at 0E4000h..0E7FFFh** must be set as: **PCI BUS**