



Theory of Operations

Network Servers





Overview

This document describes the chain of events that occurs when a Network Server is powered on. It is designed to help you better diagnose server failures to boot.

When you press the front power switch of a Network Server, the following must function correctly:

- AC power path
- DC power path
- Power controller path
- Power On Self Test (POST)
- Open Firmware launch
- Boot process





AC Power Path

First and most important, an AC path must exist to the unit's power supply. This means that the unit is plugged in, the AC line filter is working, the AC interlock switch is closed because the logic board is fully seated, and the power supply is installed correctly and functioning properly.





DC Power Path

Second, a DC path must exist between the power supply and the logic board. This means that the internal power cable is correctly installed, and the power supply is supplying a trickle voltage (+5 volts) to the power controller IC (Cuda).





Power Controller Path

A logical and physical path must exist from the front panel switch (or keyboard power switch) to the power controller. This means that the rear keyswitch is in the locked position, the processor card is fully seated, the Cuda chip is in the proper idle state, and the cables and connectors to the power switch are all in working order. If these conditions exist, power on will be successful. However, a quick shutdown could occur at this point if a short circuit exists, because the power supplies detect short circuits and automatically shut down to prevent hard failure. Also, the +5 volt line is monitored by the power monitor IC on the logic board and if the voltage is below +4.7, the unit will also shut down.





Power On Self Test (POST)

Once valid power is applied to the logic board, the processor will execute instruction procedures from the system ROM on the logic board. The first software procedures in the ROM are called Power On Self Test (POST). It is the job of POST to initialize the hardware into a working state and establish a software path to the LCD. The LCD is then written with progress reports on the state of the discovered hardware: DRAM; SRAM cache; and various fan, temperature, and power supply fail states. DRAM is sized and tested (but not exhaustively), and finally control is turned over from POST to Open Firmware.





Open Firmware Launch

It is the primary job of Open Firmware to find a bootable device (CD, floppy, or hard disk) based on the device or devices listed in the boot path and the position of the front panel keyswitch. Open Firmware builds what is known as a device tree, which identifies the hardware configuration to the operating system. The operating system interacts with Open Firmware to pass device tree information and eventually to set the default boot path in the system's non-volatile RAM. This means that once a hard disk is installed with AIX, the machine will automatically boot to the hard drive.

If Open Firmware detects the key in the service position on a Network Server that has never been booted before, it will automatically attempt to find a diagnostic floppy or Install CD to boot from.





Boot Process

For Open Firmware to find a bootable device, the logic board, mezzanine interconnect board, SCSI cables, SCSI devices, and SCSI backplane must all be properly functional. If this is the case, Open Firmware can find the boot blocks on the bootable device. “Bootapple” messages are then written to the screen, and a compressed “bosboot” image is loaded from disk into DRAM, expanded, and jumped to so that AIX execution can begin. The AIX kernel is then launched.

At this point various configuration methods are run, file server mode (auto-on) is turned on, the system boot “quack” is sounded, and the first system-wide interrupts are taken. SCSI buses are walked to discover attached devices, a File System Check (fsck) is performed. Ethernet is also configured, eventually nameservers are queried, various daemons are started, and usually the CDE (Common





Desktop Environment) desktop is launched. The unit is now operational.

Note: If any problems occur during this startup process, refer to the appropriate Symptom Chart in the Troubleshooting chapter of the Network Server service manual for additional information.

