

## TROUBLESHOOTING OPERATING SYSTEM ABENDS

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This ABEND troubleshooting package, TABEND.EXE, includes the following files:

Tabend.txt This document in text format.

Tabend.wp5 This document in WordPerfect 5.1 format.

Tabend.wp6 This document in WordPerfect 6.1 format

Ck\_list.txt Appendix A of this document in a separate file.

RCSI.txt "Resolving Critical Server Issues." An article from the Feb. 1995 Application Notes in text format.

RCSI.wp5 "Resolving Critical Server Issues" article in WordPerfect 5.1 format.

RCSI.wp6 "Resolving Critical Server Issues" article in WordPerfect 6.1 format.

Config. The self-extracting file which contains config.nlm. This NLM is used to collect server information.

The article "Resolving Critical Server Issues" covers ABEND and GPPE troubleshooting in great depth. The Application Notes can be downloaded from CompuServe at "go NetApps." There may be a charge for this service. You can also purchase the AppNotes by calling 1-800-377-4136.

This document is an attempt to help you better troubleshoot an ABEND on your own before you place a call to Novell. Each of the steps listed here are necessary steps. Most ABEND problems will be resolved by doing what this document outlines. If, in your case, this does not solve your problem, instructions are given for what to have ready when you place a call for support.

### What Is A Server ABEND

An ABEND occurs when program execution is halted abnormally. There are many ABEND messages, but the three most common are GPPE (General Protection Processor Exception), Page Fault Processor Exception error, and NMI (Non-Maskable Interrupt). These three errors are all processor exceptions, meaning that they are generated by the processor. NetWare merely reports the message.

“The NetWare 3 and 4 operating systems continually monitor the status of various server activities to ensure proper operation. If NetWare detects a condition that threatens the integrity of its internal data (such as an invalid parameter being passed in a function call, or certain hardware errors), it abruptly halts the active process and displays an “ABEND” message on the screen. (“ABEND” is a computer science term signifying an ABnormal END of program.)

The primary reason for ABENDs in NetWare is to ensure the stability and integrity of the internal operating system data. For example, if the operating system detected invalid pointers to cache buffers and yet continued to run, data would soon become unusable or corrupted. Thus an ABEND is NetWare’s way of protecting itself—and users—against the unpredictable effects of data corruption.” (Resolving Critical Server Issues. Feb. 1995 Application Notes. Page 37.)

## How To Troubleshoot An ABEND - Step 1

An ABEND can be caused by hardware or software. It is easier and cheaper to troubleshoot the software first. The steps in this section alone may solve your server ABEND, and may also prove to be valuable preventative maintenance that will avert other problems. Appendix A of this document is a summary sheet that you should fill out as you troubleshoot your server. If you end up opening a Technical Support Incident at Novell, the Support Engineer will want this sheet from you.

**NOTE:** An NMI Parity error (ABEND: Non-Maskable Interrupt) is a special case of ABEND error. NMI errors are hardware problems. See Appendix B - Dealing With An NMI Error.

**1. Update all LAN and disk drivers.** Each manufacturer of LAN and disk cards must develop their own drivers. The only way to assure that you have the latest version of these drivers is to download them from the respective vendor. Even new hardware does not usually ship with the most current drivers. **THIS STEP IS CRITICAL** - Be certain that drivers are the newest available from the respective vendor!!! Another part of this step is to have updated LAN support modules. These modules include msm31x.nlm or msm.nlm, and ethertsm.nlm and/or tokentsm.nlm (or any other tsm module that your system may require). Get the latest version of Landr?.exe (where the ? represents the revision number or letter of the file). See Appendix C - How To Access The NetWare OS Patches And Updated Files.

**2. Apply all patches.** There are known issues with the OS that the patches have been written to fix. Load ALL the patches that apply to your version of the operating system. We also find that the patches invariably solve other problems that we may not have known about. The file name you need to get is <OS version>PT<file revision number or letter>.EXE. For example, patches for a NetWare v3.12 server would be in the file 312pt6.exe, where “6” is the current

revision of the patch file. See Appendix C - How To Access The NetWare OS Patches And Updated Files.

**3. Re-copy server.exe.** File corruption can happen to any file, even the server.exe. A corrupt server.exe can be difficult to track down. For this reason, it is easier to perform this step than to find out, after a lot of troubleshooting, that a corrupt server.exe was the problem. If the corruption were only in server memory the solution would be to down and exit the server and then power off the machine and turn it back on.

Just in case the corruption has been written to disk, copy a fresh copy of server.exe from the original disks or from a write protected working copy. The same idea applies to any other file or files in the system or public directory that may have become corrupted.

**Remember**, the server.exe in NetWare v3.x contains the server license number. Don't copy the wrong server.exe.

**4. Update clib, streams, & SPX Files.** Clib.nlm is a library of functions that many Novell and third party modules use to access the operating system functionality. Because of this clib.nlm changes often. Streams.nlm works in conjunction with Clib.nlm but does not change as often. You should check to see that both of these modules are the current version.

Spxs.nlm is used for much of the server to workstation communications. This NLM should also be updated to the current version.

See Appendix C - How To Access The NetWare OS Patches And Updated Files.

**5. Do a Virus Scan of the DOS and NetWare Partition.** This should be habit during any troubleshooting.

**6. Other Things To Look At.** Here is a list of of items that have been known to cause server ABENDS.

- Power fluctuations at the power source.
- A failing power supply.
- A bad cooling fan. (Heat Kills Hardware!)
- A dry, hot or dusty environment can encourage hardware degradation and failure due to static electric discharge.
- Check the server's error log for other clues.
- Look for other problems that may end up being related. For example lost connections, drive deactivation, climbing packet receive buffers, high dirty cache buffers, a high number of LAN errors, high utilization, etc..

Another question to ask that may point you in the right direction is, "What changes have been made to the server environment lately?" **Don't automatically say, none.** Have you

increased the number of users? Is there new software? Has software been upgraded? Is someone using software in a way different than it had been used, such as database indexing, etc.? Is there new or different hardware? Have there been changes to the LAN, the routers, or the cabling? Have workstations or the file server been physically moved? Are there new printers on the LAN? Have there been any power outages? Have SET parameters been changed? Etc.....

## How To Troubleshoot An ABEND - Step 2

If the problem is not solved by now you have two troubleshooting paths to pursue. **One - it is a hardware problem**, and **Two - it is a misbehaving NLM**.

**Hardware** Hardware is actually the most likely cause at this point. When troubleshooting hardware break the network down into its component parts, or subsystems. The subsystems to consider are LAN Channel, Disk Channel, and System Board. Then use the ABEND message to point you in the direction of one of these subsystems. Most disk channel errors are easy to pick out. ABENDs that mention *server process...* are often, but not always, LAN related. Errors that refer to *...memory...*, *...alloc...*, or *...allocator....*, etc. can be memory, system board, or NLM related. Once you establish a direction try replacing the hardware that you think could be causing the ABEND. As a matter of routine always check for poorly seated cards, dirty connections, faulty cables, and things like termination and SCSI ID (vendors sometimes differ on how they handle termination and SCSI ID - Be Aware). In some cases the problem can be compatibility between hardware components.

**NLM's** The next most likely issue is a misbehaving NLM. First, try to find a way to duplicate the ABEND at will. Look for anything that seems to happen concurrently with the ABEND. Ask yourself questions like these: Does the ABEND happen at the same time of day, or the same day of the week? Is there a certain application that is always running, or is there some function in an application that is always running such as database indexing? Is there a certain workstation or segment that is also having a lot of problem (incorrectly formed packets can cause a server ABEND)?

These questions may help you to "divide and conquer" the problem. Next, remove **ALL** non-essential NLM's. This should include virus scanners, diagnostic and monitoring NLM's, and NLM's that are not Novell certified. If the server seems to stabilize, load these NLM's back to the server one at a time. Let the server sit after each NLM is loaded to assure that it is ok to continue troubleshooting.

If you have the luxury of being able to duplicate the ABEND at will, troubleshooting is much easier. Bring up the server using "server -ns." This will bring up the server without loading the startup.ncf file. Now load drivers and NLM's one at a time and try to duplicate the ABEND. The intention is to find an NLM that is responsible for the ABEND. If you find an NLM that causes the ABEND contact the developer of that

NLM.

### How To Troubleshoot An ABEND - Step 3

If the problem hasn't cleared up by this point it's probably time to call in reinforcements. Your first step should be to call a Novell Authorized Service Center (NASC). These Gold and Platinum dealers are Novell Netware trained and willing to help you. To find the service center closest to you call 1-800-NET-WARE (638-9273), choose option 1, then choose option 2. Someone is there to assist you from 7:30am to Midnight CST.

If you still need to contact Novell Technical Support **Do The Following Before You call us.**

1. Run the NLM "config.nlm" at your server. This NLM was included with the TABEND.exe (troubleshooting ABENDs) file that you downloaded. When it completes it will place a file named "config.txt" in your sys:system directory. This file contains important server information that we can use to help troubleshoot your ABEND. You will probably be ask for this file by the Novell Technical Support (NTS) Engineer. He will tell you at that time how to get it to us.
2. Next, fill out the form in Appendix A. This form is included as the file ck\_list.txt. When complete, append the form to the config.txt file that was created in the previous step.
3. At this point open an incident with Novell Technical Support. Tell the support engineer that you have the config.txt file ready.
4. Consider the possiblity that you may need to get a core memory dump from your server. A core memory dump takes a "snapshot" of the server's RAM as it looks at the time of the ABEND. We call this the "memory image." This image can be collected and sent to Novell on floppy, tape, or via FTP. We are able to use the information found in your memory image to help isolate what is causing your server ABEND. For complete instructions on how to collect a memory image see the appendix of the document "Resolving Critical Server Issues." This document has been included.

DO NOT automatically take a core dump. Wait until a Technical Support Engineer instructs you to do so. Also, **Do not send us core dumps from servers that do not have the patches and current LAN and disk drivers loaded.** Too often we end up spending time on a problem that has already been resolved by current patches or updated software. Make sure you have the current patches and current LAN and disk drivers!

## Appendix A - Check list/Summary

Incident Number:

Name:

Phone:

O/S version \_\_\_\_\_ DS version \_\_\_\_\_ Amount of RAM  
\_\_\_\_\_

Make/Model of Machine (indicate if a clone)/Bus Type  
\_\_\_\_\_

LAN card, driver name, driver date & version \_\_\_\_\_, \_\_\_\_\_,  
\_\_\_\_\_

LAN card, driver name, driver date & version \_\_\_\_\_, \_\_\_\_\_,  
\_\_\_\_\_

HBA (controller), driver name, driver date & version \_\_\_\_\_, \_\_\_\_\_,  
\_\_\_\_\_

List the devices on this HBA:

HBA (controller), driver name, driver date & version \_\_\_\_\_, \_\_\_\_\_,  
\_\_\_\_\_

List the devices on this HBA:

Are your drives mirrored? Y N Or, duplexed? Y N How much total volume space?  
\_\_\_\_\_

1. Have you updated the LAN and disk drivers? Y N
2. Have you applied all the appropriate patches? Y N
3. Have you copied a fresh copy of Server.exe? Y N
4. Is your clib.nlm current? Y N
5. Have you virus scanned the DOS and Netware Partition? Y N
6. What other information do you have that may help troubleshoot this problem?

7. What changes have been made to the server recently? (Increased number of users, new

software, upgraded software, new or different hardware, LAN or router changes, workstations or file server physically moved, power outages, set parameter changes, etc...)

8. What hardware has been swapped out already?

9. Do you have config.txt ready to upload to us? Y N (Upload <incident number>.TXT)

## **Appendix B - Dealing With An NMI Error**

As mentioned in the main body of this document, an NMI error is a hardware problem. There are three types of interrupts that a processor can handle: a maskable hardware interrupt (INTR), a non-maskable hardware interrupt (NMI), and a software interrupt (INT). The processor has a dedicated line on the system board bus that handles only non-maskable hardware interrupts. According to *Intel's - i486 Microprocessor Hardware Reference Manual* this NMI line can be asserted as a result of one of three catastrophic events: 1) an imminent power loss, 2) a bus-transfer parity error or, 3) a memory-data parity error. When this NMI line is asserted the processor generates an NMI error. This error is received by the NetWare operating system and then reported to the console screen. There are two flavors of NMI errors, "ABEND: NMI parity error generated by IO check," and "ABEND: NMI parity error generated by System Board." If the NMI is generated by the system board there is a fairly good chance the problem is with the system board or its' memory, although it can still be elsewhere. If the NMI is generated by an IO check, the problem could be anywhere. Here is a list of hardware related items that we have found to cause NMI's. These idea's should help you as you troubleshoot an NMI error.

1. Faulty RAM.
2. Faulty system board
3. Any I/O card. Especially cards with on-board memory.
4. Low or fluctuating power at the power source. Remember, UPS's can go bad too.
5. Power supply going bad.
6. Memory extension boards.
7. System board memory that is mismatched in either speed or brand.
8. Conflicting interrupts.

9. Try cleaning and reseating cards/cables/and memory modules.
10. Incompatibility between hardware pieces.
11. Look at the environment and how the equipment is handled. NMI's can often be traced back to static electric discharge. A sometimes overlooked point is that static does not always cause immediate failure, the damage can be degenerative. The hard failure may not occur until sometime in the future.
12. This is rare, but, we have also seen hard drives cause NMI's.

## Appendix C - How To Access The NetWare OS Patches And Updated Files

### What file to download?

The patches for each version of the OS are grouped into a compressed, self-extracting executable file. These files are named as follows: <OS version>PT<file revision number or letter>.EXE. For example patches for a NetWare v3.12 server would be in the file 312pt6.exe, where "6" is the current revision of the patch.

This is a list of files mentioned in document:

NLM Name	File to Download	CompuServe Location	FTP location
clib.nlm	Libup?.exe	NovFiles library	NovFiles
streams.nlm	STRTL?.exe	3.x or 4.x Specific files	Novlib\04 and 14
spxs.nlm	STRTL?.exe	3.x or 4.x Specific files	Novlib\04 and 14
3.11 patches	311PT?.exe	3.x Specific files	Novlib\04
3.12 patches	312PT?.exe	3.x Specific files	Novlib\04
4.01 patches	401PT?.exe	4.x Specific files	Novlib\14
4.02 patches	402PT?.exe	4.x Specific files	Novlib\14
4.10 patches	410PT?.exe	4.x Specific files	Novlib\14

Where "?" represents the current revision of the file.

### How to get the updated files?

NSE Pro The Netware Support Encyclopedia CD Rom has all the latest OS patches and updates. The NSE can be purchased by calling 800-346-7177.

CompuServeGet onto CompuServe and "Go Netwire," choose "File Updates," choose "Novlib," choose "Library," then choose from the list of libraries.



FTP            If you have an Internet connection and FTP to FTP.Novell.Com.

Web Server <http://www.novell.com/>

## **How to apply the patches?**

Place the compressed/executable file in its own directory and run it. Get the read me file named <filename>.txt. This read me file will give any detailed instructions necessary to properly load the patches. If you are running NetWare v3.11, load the patches listed under the *abstract* section on the first page of the readme (311PT?.TXT). If you are running NetWare v3.12 or any version of NetWare v4.xx load ALL the patches.

There are three types of patches.

**DYNAMIC** -- Dynamic patches are implemented as <patch name>.nlm files that can be loaded/unloaded while the server is running. Unloading a dynamic patch will restore the Operating System to its original "un-patched" state.

**SEMI-STATIC** -- Semi-static patches can also be loaded while the server is running, but they cannot be unloaded. It is not possible to undo the effects of a semi-static patch without first downing the server and bringing it back up without loading the semi-static patch.

**STATIC** -- Does not apply in the context of this document.

Dynamic and semi-static patches modify the Operating System in memory, not on the disk. This means that dynamic and semi-static patches must be loaded each time the Operating System is brought up in order for any 'fixes' to take effect. Add a line to the AutoExec.ncf or Startup.ncf, whichever is applicable, to automatically load each patch the next time the server is downed and brought back up.

In order to see which patches are currently loaded on the system, type "PATCHES" at the file server command line. The patches will then be grouped and displayed according to their type (i.e. - STATIC, SEMI-STATIC, or DYNAMIC). If you already have patches loaded check dates to make sure you have the most current versions.

## **Appendix D - Help Us To Help You**

If this document has helped you to solve your ABEND problem such that you did not have to open an incident with Novell Technical Support, we would like to hear about it. Simply fax us this page with your comments on it. Fax the form to Novell Technical Support at (801)429-5200 to the attention of "TABENDS FEEDBACK." Thanks for your feedback.

**NOTE:** This form is for comments only. We will not be able to response to any comments/questions given here.

Your Name:

Company Name:

Address:

Phone Number:

Were you able to solve your ABEND problem without opening an incident with Novell Technical Support? If so, tell us the nature of your problem and how this information helped you.

How can we make this document or the included files more useful to you?

Are there other issues that might lend themselves to this type of support ?

What else would you like to see Novell Technical Support doing to make your job of supporting your network environment easier?