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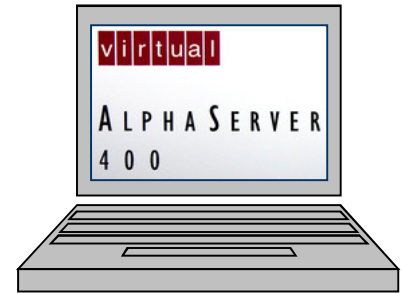


Continuity in Computing

Avanti™ Release Notes

Version 4.0.0.663

10-AUG-2021



This document provides the latest information on the current release of Migration Specialties Avanti™, AvantiFlex™, and FreeAXP™ Alpha emulators. It includes recent enhancements, bug fixes, known problems, and usage tips.

Avanti and **AvantiFlex** are commercial products that can be purchased through Migration Specialties. **Avanti** and **AvantiFlex** provide features and performance beyond those offered by **FreeAXP**. **FreeAXP** is a free product available for personal and commercial use. **FreeAXP** is unsupported without purchase of a support contract. **FreeAXP** users without a support contract can post questions and search for answers at the [FreeAXP User Forum](#) at the [OpenVMS Hobbyist](#) web site.

Avanti & AvantiFlex Links

- Product Info:** <http://migrationspecialties.com/Emulator-Alpha.html>
- User Guide:** http://migrationspecialties.com/pdf/VirtualAlpha_UserGuide.pdf
- Release Notes:** http://migrationspecialties.com/pdf/VirtualAlpha_ReleaseNotes.pdf
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- Pricing Guide:** <http://migrationspecialties.com/pdf/VirtualAlphaPricingGuide.pdf>

FreeAXP Links

- Product Info:** <http://migrationspecialties.com/FreeAXP.html>
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- User Forum:** http://vmshobbyist.org/forum/viewforum.php?forum_id=163
- Download:** <http://migrationspecialties.com/FreeAXP.html>

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1. NAMING CONVENTIONS

Throughout this document **Avanti** will be used to represent the Migration Specialties virtual Alpha products **Avanti**, **AvantiFlex**, and **FreeAXP**. Most installation, configuration, and runtime tasks are the same for all three products. Where distinctions are necessary, the products are referenced by name.

2. DOCUMENTATION UPDATES

The Avanti User Guide received substantial updates as part of the Avanti version 4.0 release. These are some of the highlights.

- Section 7.6.4.3 added: Auto-Exit
- Section 7.6.4.4 added: Auto-Idle
- Section 14.11 added: Avanti Clock
- Section 15.5 added: Auto-Idle Restart on Bug Check (OpenVMS)
- Section 16.5 added: V5 Disk Considerations (Tru64 UNIX)
- Section 16.8 added: Tru64 UNIX Panic Recovery (Tru64 UNIX)

3. HOST O/S AND TESTING

3.1 Avanti Host Environments

With the release of version 4.0, FreeAXP, Avanti and AvantiFlex support 64-bit (x64) Windows host operating systems only. Versions of FreeAXP prior to V4.0 supported 32-bit Windows operating systems. We test Avanti under the following Windows O/S and virtual machines:

Host O/S	x64	VMware
Windows Server 2019	✓	✓
Windows Server 2016	✓	✓
Windows Server 2012 R2	✓	✓
Windows Server 2012	✓	✓
Windows 10	✓	✓
Windows 8.1	✓	✓

3.2 Legacy Host O/S

Avanti 4.0 is built using the latest Windows Visual Studio and Intel C++ compiler. This development environment does not support the following legacy Windows O/S:

- Windows XP
- Windows Vista
- Windows Server 2003
- Windows Server 2008 Std

Migration Specialties maintains a legacy development environment to support customers with software support contracts running under these retired Windows O/S.

4. PRODUCT UPDATES

4.1 AlphaServer 400/166 Performance

Avanti 4.0 with JIT enabled runs 450% faster than a real AlphaServer 400/166 when tested on a quad-core Intel Core i7-7500U @ 3.5GHz host server. Avanti 4.0 without JIT runs 75% faster than the AlphaServer 400/166 running on the same host hardware. Host CPU speed corresponds directly to emulator Alpha CPU speed, so providing a faster host CPU will have a direct impact on emulator performance.

4.2 Automatic CPU Idle Feature Added (Auto-Idle)

Avanti 4.0.0.663 introduces the *Auto-Idle* feature. Past version of Avanti utilize one host CPU running at 100% to emulate the Avanti Alpha CPU. With the new *Auto-Idle* option selected, Avanti will idle the host CPU when the guest O/S (Tru64 UNIX or OpenVMS) is not busy.

The Charon Idle and HP Idle utilities, available under OpenVMS only, provide similar functionality. These utilities work under Avanti and can continue to be used. *Auto-Idle* will not function if the Charon or HP Idle utilities are installed.

Note: Using *Auto-Idle* on I/O intensive applications will reduce application performance. Migration Specialties recommends disabling CPU idle features to achieve maximum performance.

4.2.1 Auto-Idle Restart on Bug Check

If the *Auto-Idle* feature is enabled, the system firmware *auto_action* parameter is set to *boot*, and an OpenVMS bug check occurs, VMS will automatically reboot once the bug check has completed its memory dump. In this scenario, *Auto-Idle* will not re-engage. A full Avanti shutdown and restart will be required to re-enable *Auto-Idle*.

4.3 Automatic Avanti Shutdown (Auto-Exit)

Prior to Avanti 4.0, issuing a VMS @SYS\$SYSTEM:SHUTDOWN or Tru64 UNIX shutdown -h or halt would shut down the operating system and leave the user at the console prompt (>>>) on the console session. Avanti itself was terminated by entering *exit* at the console prompt, using *Power off* from the Avanti Taskbar icon, or stopping the Avanti service using the Windows Session Manager.

Under Avanti 4.0, the new *Auto-Exit* parameter can be set to terminate Avanti automatically when a VMS @SYS\$SYSTEM:SHUTDOWN or Tru64 UNIX shutdown -h or halt is issued. With *Auto-Exit* set, the console prompt can still be reached using Ctrl^P or the Tru64 UNIX init 0 command.

Note: If a bug check or panic occurs when *Auto-Exit* is set, the Avanti session will terminate once the associated memory dump as completed.

4.4 OPA0/tty00 and TTA0/tty01 Port Access Restricted

Prior to Avanti 4.0, if ports were assigned to OPA0/tty00 and TTA0/tty01 for virtual serial access, the ports were open network wide. Avanti 4.0 restricts port access to the local host only. This is accomplished by only binding to the 127.0.0.1 interface, rather than all available

interfaces. It means that outside of the localhost, it appears that the port has not been opened at all.

The port can be open for network wide access by enabling the *allow_remote* property under each serial ports **Advanced properties** settings. Allowing network access to the ports is a security issue, particularly with the console port (OPA0/tty00).

4.5 NDIS Default Driver

Avanti supplies its own NDIS5 network driver, *msipcap*. This is the default driver used with Avanti.

Starting with Avanti 4.0, if a Winpcap compatible network drive like the Nmap.org *Npcap* NDIS6 driver is installed on the host system, Avanti defaulted to it as its network driver. This behavior has been changed with the release of Avanti 4.0.0.653 due to poor observed performance of the Npcap driver. Msipcap is again the default driver. If use of a Winpcap compatible driver is desired, open the VLC + options box and check the *use_npcap_driver*.

4.6 Log File Updates

The following changes have been made in the Avanti 4.0 log file.

- Avanti now logs when it is started as a service.
- JIT buffer usage during an Avanti session is now logged. A line similar to this will appear near the end of the log file.

```
20210506200258.674: JIT buffer size 2147483648 bytes, used 713031680 bytes.
```

- The date stamp in the log file is now human readable. It is formatted *YYYYMMDDHHMM.hhh*.
- Prior to Avanti 4.0, log file messages about license expiration and license unit usage could be erroneous. This has been corrected.

4.7 wmi Option Removed

The wmi option in the Avanti log file options box has been removed. The wmi option controlled the inclusion of Windows O/S information into the Avanti log. This information is now included by default, making the wmi option redundant.

5. KNOWN ISSUES

This section covers issues impacting Avanti going back to the original release. Thus, some of the information is dated. It remains pertinent for users running older implementations. Subjects are arranged alphabetically by topic.

5.1 AnywhereUSB Reboot Issue

Several customers have reported that when doing a soft reboot on an AnywhereUSB device that holds an Avanti key, the device does not always re-serve the key to the VMware session. A hard reboot of the AnywhereUSB device is required to restore access to the license key. We have reported this issue to the vendor. Running Avanti 2.4.1.502 or higher greatly reduces the risk of encountering this problem.

When the license key doesn't come back, the Windows Device Manager shows a warning triangle for the "AnywhereUSB Root Hub" devices, with a warning message "Device cannot start". In that case, restarting the emulator also doesn't fix the problem (the port stays down). The "AnywhereUSB Remote Hub Configuration Utility" doesn't show any errors, but the Windows Device Manager does.

What does fix the problem when the system is in this state is disabling the "Network Attached USB Enumerator" device. After a few seconds the devices will come back. Disconnecting and reconnecting to the AnywhereUSB device using its configuration utility also works.

After rebooting the AnywhereUSB device, open the Windows Device Manager and check the status of the AnywhereUSB Root Hub devices. If these have a warning triangle, use the AnywhereUSB configuration utility to disconnect from the AnywhereUSB device, then reconnect. After the connection is complete, verify that the AnywhereUSB Root Hub devices are working.

5.2 End Point Security Issues

If Avanti mysteriously halts or disappears after running for a period of time, check that end point security products are not interfering with the process. We have had reports of Tanium (www.tanium.com/) products blocking Avanti because of its 100% utilization of a single host CPU. Wherever possible, place the Avanti executable (dec.exe, freeexp.exe) on security and anti-virus exclusion lists.

5.3 OpenVMS Issues

5.3.1 OpenVMS Alpha V8.4-2L2

VSI's OpenVMS V8.4-2L2 Performance Release for Alpha requires Avanti version 3.0.0.617 or higher.

5.3.2 Auto-Idle Restart on Bug Check

If the *Auto-Idle* feature is enabled, the system firmware *auto_action* parameter is set to *boot*, and an OpenVMS bug check occurs, VMS will automatically reboot once the bug check has completed its memory dump. In this scenario, *Auto-Idle* will not re-engage. A full Avanti shutdown and restart will be required to re-enable *Auto-Idle*.

5.4 Tru64 Unix Issues

5.4.1 Tru64 Unix Disk Serial Numbers

Avanti allows serial numbers to be assigned to each disk or CD drive in the advance disk options. OpenVMS and Tru64 UNIX 3.x and 4.x ignore the disk serial numbers. Tru64 UNIX 5.x requires them. If a serial number is not present, Avanti generates one for each disk.

Versions of Avanti prior to 3.0.0.620 had three potential problem with disk serial numbers.

1. User defined CD device serial numbers are ignored. The Avanti generated serial number is always used.
2. Avanti generated serial numbers for disk devices are not unique across SCSI adapters. A disk on adapter 0 and a disk on adapter 1 may receive the same generated serial number. The workaround is to manually set the serial numbers using the properties option [+] associated with each disk definition in the Avanti configuration utility.
3. The generated serial numbers for all HSZ22 disks were the same, resulting in system hangs under Tru64 UNIX 5.x. The workaround is to manual set the serial numbers using the properties option [+] associated with each disk definition in the Avanti configuration utility.

These problems have been corrected in Avanti 3.0.0.620.

5.4.2 Tru64 Unix Panic Recovery

If Tru64 Unix experiences a panic and the Alpha firmware option *boot_action* is set to *boot*, the reboot will hang. This is true on all versions of DEC and Tru64 UNIX supported by Avanti.

5.5 License Key Conflicts

Avanti utilizes a Keylok USB license dongle. Other software providers may also utilize this dongle. If a host system runs two different software products utilizing the same license dongle technology, there may be license conflicts.

5.5.1 AlphaVM License Conflict

AlphaVM products install a license service named [EmuVMLicense](#). The [EmuVMLicense](#) service will interfere with an Avanti key. The [EmuVMLicense](#) service needs to be disabled via the Windows Service Manager before using Avanti. Also, check all processes under Task Manager and make sure that an executable named [keylok_service.exe](#) is not present. If [keylok_service.exe](#) is present, kill the process before using Avanti.

5.6 VMware USB Key Support

When configuring a USB device to support the Avanti license dongle in a VMware instance, avoid enabling USB 3.0 support. Set the port up for USB 1.1 and USB 2.0 support.

5.7 Windows Issues

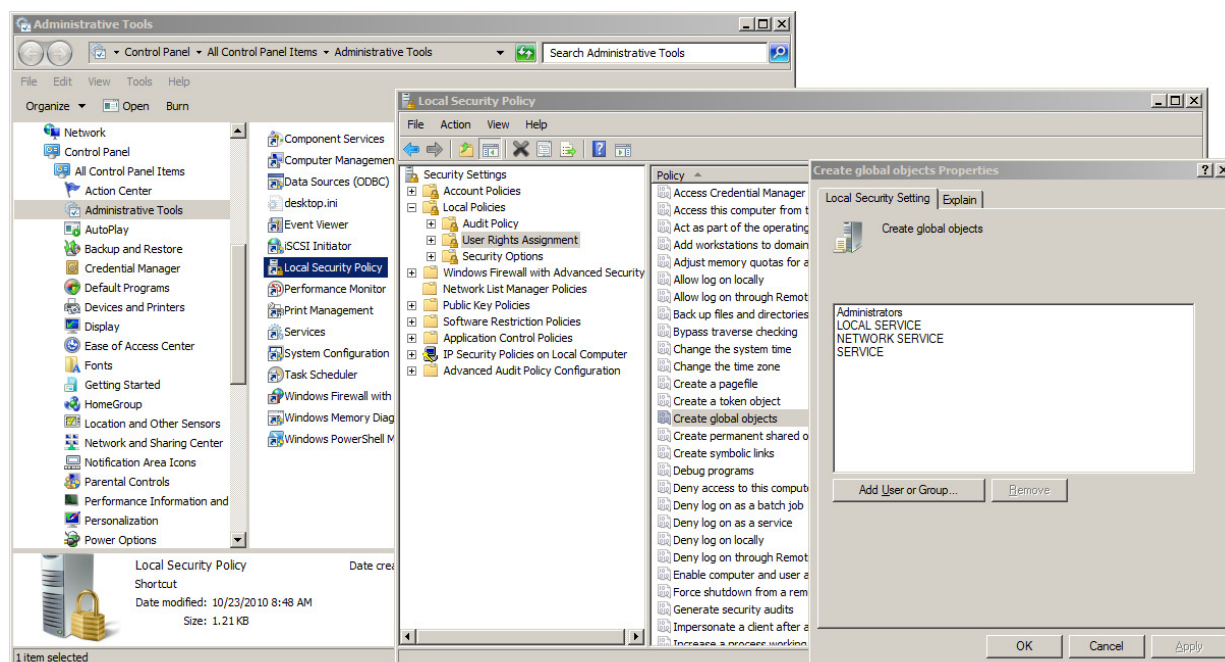
5.7.1 Remote Desktop and Avanti Icon

When managing a server running multiple instances of Avanti via Windows Remote Desktop, the Avanti icon right-click menu does not always clear as expected. It is sometimes possible to have one Avanti icon menu obscure another. This is an issue with Remote Desktop, not Avanti.

5.7.2 Running Avanti From a Non-Administrator Account

On some versions of Windows, an attempt to start Avanti as a non-administrator user may fail with the error message “Could not initialize mapped file for IPC”. This is known to happen under Windows Server 2008 and Windows 7. To resolve this issue, the “Create Global Objects” privilege needs to be granted to the Avanti user account. To grant the privilege, log into an administrator account and complete the following steps:

- 1) Start> Control Panel> Administrative Tools> Local Security Policy
- 2) Open Local Policies and select User Rights Assignment.
- 3) Double click Create Global Objects and click Add User or Group to grant this privilege to the user that needs to run Avanti.



5.7.3 Avanti Service Will Not Launch

If Avanti is installed as a service, it will not launch, and an Avanti log file is not being produced, check the following.

- Make sure the Avanti configuration file listed in the Services name field actually exists.
- Check that the configuration file name and the service name minus the *Avanti_* prefix are an exact match. I.e. The service name *Avanti_Alpha01* should point at the configuration file *Alpha01.cfg*.

One of the following misleading Windows errors may indicate a configuration file name is incorrect or the configuration file is missing.

- If trying to launch the Avanti service from the Windows Services widget and the following pop-up error appears:

The Avanti_Alpha01 service on Local Computer started and then stopped. Some services stop automatically if they are not in use by other services or program.

- If checking the Event Viewer System messages (*Computer Management*> *System Tools*> *Event Viewer*> *Windows Logs*> *System*) and the following error is found:

The Avanti_Alpha01 service is marked as an interactive service. However, the system is configured to not allow interactive services. This service may not function properly.

5.8 Network Issues

5.8.1 Windows 10 Pcap Signature

Windows 10 Version 1709 Build 16299.371 and higher object to the msipcap signature in Avanti 614 and 617 and will not install Pcap, leaving Avanti without network access. Avanti 598 installs and runs without issue. Windows 10 Version 1709 Build 16299.309 and older do not have this problem.

The issue came about because Windows 10 now requires registration of kernel mode drivers with Microsoft. Avanti 3.0.0.620 addresses the problem. If you encounter the pcap license error, downgrade to Avanti 598 or upgrade to Avanti 620 or higher.

5.8.2 WinPCAP 4.1.3 Issue

Installation of the WinPCAP 4.1.3 NDIS driver disables the Avanti NDIS driver. If running applications that use WinPCAP, such as SimH VAX or Wireshark, used the WinPCAP 4.1.2 NDIS kit on systems running Windows 8.1 or Server 2012 and lower.

All version of WinPCAP conflict with the Avanti NDIS driver under Windows 10 and Server 2016. Use Win10PCAP or Npcap to avoid this issue.

5.8.3 Windows 10 Version 1709 msipcap Issue

We have seen an intermittent issue with Windows 10 version 1709 where if Avanti or the Configuration Utility is started immediately after booting Windows, they will hang. Windows must then be rebooted to recover. The issue is a conflict with the Avanti NDIS msipcap driver unique to certain builds of Windows 10 v1709. The fix is to upgrade Windows 10 to version 1803.

If you encounter this problem, a work around is to run the following commands from the Windows Command Prompt prior to launching Avanti or the Config Utility. Be sure to use "Run as administrator" when launching the Windows Command Prompt.

```
C:\> net stop msipcap
C:\> net start msipcap
```

5.8.4 Checksum Fixed Warnings

If you see Checksum Fixed messages similar to these in the Avanti log file, you may have a NDIS driver or NIC issue.

```
20200818174328.306: reading IP header Checksum Fixed dst:
00:0C:29:F3:05:71 src: 6C:2B:59:81:2B:16 proto: 0x0800 len: 1514
crc: CC1A9173
```

```
20200818174339.114: reading TCP header Checksum Fixed dst:
7C:5A:1C:51:5A:55 src: 6C:2B:59:81:2B:16 proto: 0x0800 len: 1494
crc: B205B4F4
```

The messages regarding “Checksum Fixed” indicates that the emulator received network packets with an incorrect checksum, and that it fixed these before passing them on to the emulated NIC. Possible causes for this problem are:

5.8.5 Npcap or WinPcap Network Driver Issue

If you are running Avanti 4.0 - 4.0.0.651 and you have the Npcap or WinPcap driver installed on the host system, Avanti will use it by default. Try de-installing Npcap or WinPcap, re-install Avanti, and see if you still have the issue using Avanti’s built-in msipcap driver. Upgrading the Avanti 6.0.0.653 will restore msipcap as Avanti’s default NDIS driver.

You can verify which NDIS driver is in use by looking at the Avanti log file. Look for a line similar to this:

```
20200824100157.448: Opening npcap-type driver for interface
```

5.8.6 The TCP/IP Offload Engine (TOE) functionality is in use on the physical NIC.

Try disabling TOE functionality on the NIC assigned to the Avanti system. This can be accomplished by going to the Advanced tab in the Properties window for the NIC, then disabling the following features:

- IPv4 Checksum Offload
- Large Receive Offload
- Large Send Offload
- TCP Checksum Offload

5.9 X-Client Color Mapping

Some X-windows clients may not display OpenVMS and Tru64 UNIX 8-bit color mapping correctly. Ensure the client has an 8-bit color mapping mode. For example, the *Reflection X Advantage* help file contains the following advice:

```
"If you attempt to run the X client xfishtank with TrueColor, 24-bit depth selected as the Default Visual Type, the following error message appears:
```

```
"Don't know how to format image for display of depth 24"
```

```
Some clients do not return an error message. Instead, gray, hatched patterns are displayed in place of the correct colors. If you are running an X client that does this, select PseudoColor, 8-bit depth as the Default Visual Type."
```

5.10 Third Party Emulators

5.10.1 Container File Compatibility

Other than as noted in the following sections, Avanti provides full compatibility with disk container files created by other hardware emulators that support OpenVMS, Digital UNIX, and Tru64 UNIX. This includes container files created under SimH VAX.

5.10.2 Charon Idle Loop / Powersave Driver Support

Avanti 1.0.6.271 and subsequent releases support the Charon idle loop/Powersaver driver. VMS system disks with the Charon idle loop driver installed will boot and run without issue under Avanti.

The Charon idle loop can be enabled and disabled using the system parameter `LOAD_SYS_IMAGES`. The default is 7. Changing it to 6 (clearing bit 0 = `SGN$V_LOAD_SYS_IMAGES`) prevents `SY$IDLE` from being loaded during boot.

5.10.3 PersonalAlpha & Charon Container File

If attempting to boot a PersonalAlpha or CHARON-AXP system container file using Avanti, the following changes may need to be made to achieve a successful boot:

- Disable the CHARON Accelerator utility. As with real Alpha hardware, this extension will cause a boot check under OpenVMS.
- PersonalAlpha's NIC device shows up as `ESA0`. Avanti's NIC device shows up as `EWA0`. If booting from a PersonalAlpha image, LAT, DECnet, and TCP/IP services will need to be reconfigured.

6. ARCHIVED RELEASE NOTES

The following release note apply to very old Avanti and FreeAXP versions.

6.1 FreeAXP 32-bit PuTTY String

Under the legacy 32-bit edition of FreeAXP, the PuTTY string stored in the configuration file by the Configuration utility is slightly different than that stored by the 64-bit edition of FreeAXP and Avanti.

x32 String: C:\Program Files\Common Files\MigrationSpecialtiesShared\putty.exe

x64 String: C:\Program Files\Common Files\MigrationSpecialties Shared\putty.exe

Note the missing blank in the MigrationSpecialtiesShared folder name in the 32-bit string.

This oversight has been overlooked for so long that we are not planning to correct it. Doing so would potentially break thousands of FreeAXP 32-bit configuration files. The only time it becomes an issue is if a FreeAXP 32-bit configuration file is transferred to a 64-bit system, or vice versa. If this happens, use the following steps to correct the PuTTY string:

- 1) Open the configuration file in the Configuration Utility.
- 2) Uncheck the **Start session automatically** box under each **Telnet** tab.
- 3) Save the configuration file.
- 4) Recheck the **Start session automatically** box under each **Telnet** tab.
- 5) Save the configuration file.

These steps will correct the PuTTY string.

6.2 Hardware Specific Issues

6.2.1 Marvel Yukon NIC and Samsung Laptops

There is a known problem with Samsung laptops using Marvell Yukon chip set in the onboard NIC. Assigning this NIC to the virtual Alpha may cause a NETDLLERR crash under OpenVMS. A detail problem description can be found in the [FreeAXP forum](#) at this link:

http://vmshobbyist.org/forum/viewthread.php?forum_id=163&thread_id=1341

We have been unable to reproduce the problem on other systems using a NIC with a Marvel Yukon chip set. Possible workarounds for the problem include:

- Use the DE435 instead of the DE500 virtual NIC in the Avanti configuration file.
- Update the NIC drivers.
- Use a different NIC for Avanti

6.2.2 ADMtek AN995 PCMCIA NIC

The WinPCAP driver does not appear to work at all with PCMCIA-based ADMtek AN985 10/100Mbps Fast Ethernet Adapters.

6.2.3 AMD Processor Timing Issue

Symptoms:

- **OpenVMS:** The login prompts go by too fast to enter anything.
- **Tru64:** Response time at console slows sporadically when system has no load.

On Windows versions prior to Windows 7, there is a known problem on AMD Athlon X2 systems that may cause various timing issues under Avanti. The problem is caused when the timestamp counters in each of the AMD CPU's drift apart over time since the last power-on. This drifting of the timestamps causes a higher timer-interrupt rate on the emulated Alpha. The fix is to install an updated processor driver from AMD that ties the Windows time routines to a single CPU core. The update is available at

<http://support.amd.com/us/Pages/AMDSupportHub.aspx>

This problem appears to have been corrected under Windows 7 and higher.

6.3 VMS 6.n and Large Disk Support

Starting with Avanti 2.4, VMS 6.n systems properly recognize large disks. Past versions of Avanti limited VMS 6.n systems to a maximum disk size of 8GB. Use this feature with caution, as VMS 6.n may have other issues working with large disks.

6.4 Windows XP Physical CD and Serial Devices

When running Avanti under Windows XP, if physical serial or CD devices are not displayed by the Configuration Utility, ensure XP Service Pack 2 is installed. Versions of XP prior to SP2 contain a bug that inhibits display of CD and serial devices.