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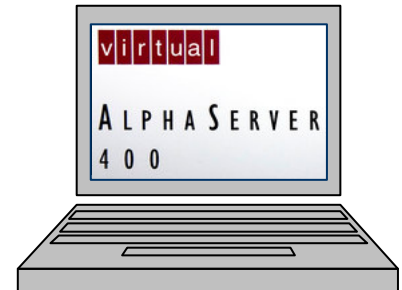


*Continuity in Computing*

## Avanti™ Release Notes

Version 3.0

13-DEC-2017



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](http://migrationspecialties.com/pdf/VirtualAlpha_UserGuide.pdf)
- Release Notes:** [http://migrationspecialties.com/pdf/VirtualAlpha\\_ReleaseNotes.pdf](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>
- User Guide:** [http://migrationspecialties.com/pdf/VirtualAlpha\\_UserGuide.pdf](http://migrationspecialties.com/pdf/VirtualAlpha_UserGuide.pdf)
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- User Forum:** [http://vmshobbyist.org/forum/viewforum.php?forum\\_id=163](http://vmshobbyist.org/forum/viewforum.php?forum_id=163)
- Download:** <http://migrationspecialties.com/FreeAXP.html>

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First Printing: January, 2010

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## 1. NAMING CONVENTIONS

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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

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The following sections have been added or updated in the [Virtual Alpha User Guide](#). The User Guide encompasses Avanti, AvantiFlex, and FreeAXP.

- **Chapter 2: Quick Start**
- **Section 3.1: Transitioning from FreeAXP to Avanti**
- **Section 4.1.5.3: Installation Log**

## 3. HOST O/S AND TESTING

---

### 3.1 FREEAXP & AVANTI HOST ENVIRONMENTS

FreeAXP supports both 32-bit (x86) and 64-bit (x64) Windows host O/S. Avanti and AvantiFlex support 64-bit (x64) Windows host O/S only. We test **FreeAXP (F)** and **Avanti (A)** under the following Windows O/S and virtual machines:

| Host O/S                 | x86 | x64 | VMware |
|--------------------------|-----|-----|--------|
| Windows Server 2012 R2   |     | F A | F A    |
| Windows Server 2012      |     | F A |        |
| Windows Server 2008 R2   |     | F A | F A    |
| Windows 10 (64-bit only) |     | F A | F A    |
| Windows 8.1              | F   | F A | F      |
| Windows 8                |     | F A | F A    |
| Windows 7                | F   | F A | F A    |

### 3.2 LEGACY HOST O/S

Avanti 3.0 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

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### 4.1 ALPHASERVER 400/166 PERFORMANCE

Avanti 3.0 runs 350% faster than a real AlphaServer 400/166 when tested on a quad-core Intel(R) Xeon(R) CPU E31230 @ 3.2GHz host server. The 64-bit edition of FreeAXP 3.0 runs 50% faster than the real Alpha 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 FREEAXP AS A SERVICE

FreeAXP 3.0 adds the option to install FreeAXP as a service. See [Section 8.14.1: Service Creation](#) in the [Virtual Alpha User Guide](#) for details.

### 4.3 TCQ BUG FIXES

Tagged command queuing support is required to designate a disk as a quorum disk under OpenVMS. Avanti 2.4.5.548 introduced a **tcq** check box in the advanced options for each disk device. Past versions of Avanti required tagged command queuing (TCQ) to be set on a virtual or raw disk device via manual modification to the configuration file.

Avanti 2.6.4.598 provides several Tagged Command Queuing (TCQ) bug fixes. If TCQ is in use, upgrading to Avanti 2.6.4.598 or higher is strongly recommended. TCQ support is required to use a quorum disk in an OpenVMS cluster.

Avanti 3.0 fixes a problem with TCQ support under OpenVMS 6.1-1H3 thru OpenVMS 7.0. The driver checks for TCQ are difference for versions of OpenVMS prior to 7.1.

### 4.4 CEV4 BUG CORRECTED

Avanti 2.6 corrects a bug found in Avanti instances with more than 2GB of memory assigned to the emulator. Prior to version 2.6, if memory utilization exceeds 2GB, the emulator may crash with the following error message:

```
ESI-F-RTM: Runtime error in 'class CEv4'. 'cpu0'thread Runtime exception: AXP-F-
CPUExc:cp(control.alpha(alpha (AS400)).cpu0(EV4):Exception in CPU thread:Runtime
exception: Win32 Exception:ACCESS_VIOLATION at 0x00000000140040694
(params:0,29951024): ..\..\src\hpal\Exception.cpp,line 127,function'ExFilter'.
```

### 4.5 AVANTI 2.4 AND FREEAXP

Prior versions of FreeAXP will not co-exist with Avanti 2.4 and higher. If using FreeAXP and Avanti 2.4+ on a single host, FreeAXP must be upgraded to version 2.4+.

### 4.6 REFLECTION 2011 & E-TERM32 VIRTUAL SERIAL PORT ACCESS

Prior to Avanti 2.4, OpenVMS login using Reflection 2011 or E-Term32 VT terminal emulators to the OPA0 or TTA0 virtual serial ports may not be possible. The Reflection and E-Term32

emulators may seem to skip password entry. PuTTY, SmarTerm, KEA, Hyperterm, and most other VT terminal emulators do not exhibit this behavior.

The Telnet standard states that a <CR> that is not followed by an <LF> should instead be followed by a <NULL>. Most VT terminal emulators do not conform to this standard. However, Reflection and E-Term32 closely follow the Telnet standard and do implement this feature. VMS does not handle the <NULL> on the serial port very well. Avanti has been updated to handle the <NULL> properly, which resolves the problem with Reflection and E-Term32 logins against virtual serial ports.

## 4.7 TIME CHANGES

Avanti 2.4 introduced a new system timer. Prior versions of Avanti used a separate thread to manage time keeping for each emulator instance. In clustered environments under heavy I/O load it was found that the timer thread could be starved, leading to timer lag and an unstable cluster. The new timer is tied to the CPU thread and cannot be starved on a busy system.

## 4.8 VMS 6 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.

## 4.9 VIRTUAL TAPE SIZE LIMIT FIX

Avanti versions prior to 2.4.4.541 run into a size limit on virtual tapes of approximately 15GB. What happens is the file allocation size used by Avanti is small and the virtual tape file becomes fragmented. As the file grows larger, Windows begins to have problems with the excessive fragmentation and eventually returns errors on I/O operations.

To correct this problem, Avanti has been updated to create or initialize a virtual tape file with an initial allocation of 100MB. If the virtual tape exceeds the initial allocation, subsequent allocations to the tape file are made in 100MB increments. When the virtual tape is dismounted, the tape file is resized to its actual size.

## 4.10 TAGGED COMMAND QUEUING (TCQ)

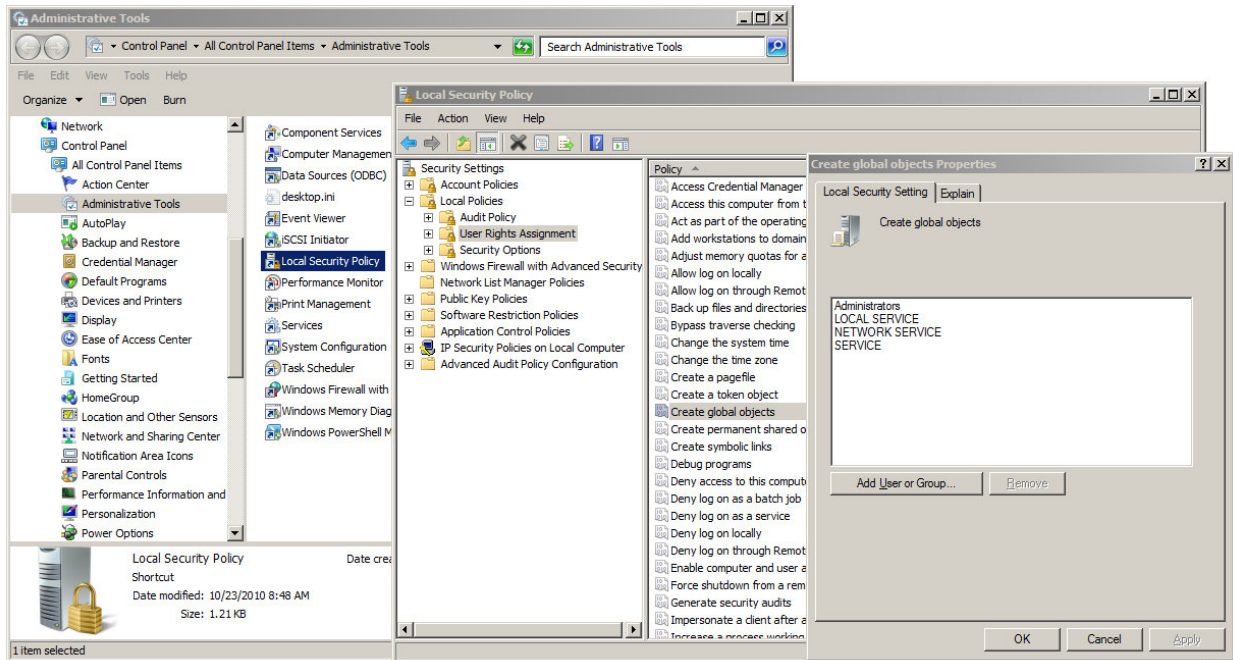
Tagged command queuing support is required to designate a disk as a quorum disk under OpenVMS. Avanti 2.4.5.548 introduced a **tcq** check box in the advanced options for each disk device.

## 5. KNOWN ISSUES

### 5.1 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 execute 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.



### 5.2 WINPCAP 4.1.3 ISSUE

Installation of the WinPCAP 4.1.3 NDIS driver disables the Avanti NDIS driver. If running applications the use WinPCAP, such as SimH VAX or Wireshark, used the WinPCAP 4.1.2 NDIS kit.

### 5.3 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 only.



## 5.4 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/](http://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.

## 5.5 VSI OPENVMS REBRANDING ERROR

If a rebranding error is encountered while upgrading a non-VSI OpenVMS system disk to a VSI version of OpenVMS, try one of the following solutions:

- Upgrade the disk to ODS-5 and enable hard links.
- Check and repair the SYSCOMMON/VM\$COMMON directory aliasing. Read the following article for details:  
[ftp://ftp.hp.com/%2F/pub/enterprise/programming\\_code/c00811161Checking\\_the\\_Alias\\_Directory....txt](ftp://ftp.hp.com/%2F/pub/enterprise/programming_code/c00811161Checking_the_Alias_Directory....txt)
- Use the DFU utility off the OpenVMS Freeware CD to analyze and repair the disk file structure.

## 5.6 VMS 7.1 INSTALLATION HALT

When installing OpenVMS 7.1 from an ISO image of the installation media, the boot process occasional halts during the first O/S boot after the installation process has completed. If this occurs, simply boot the O/S again to recover.

## 5.7 VMS 7.3 INSTALL FROM VIRTUAL RRD42

We have seen cases where the OpenVMS 7.3 installation from an ISO image goes into a mount verify and does not recover when run from an emulated RRD42. If this problem is encountered, ensure the emulated CD drive advanced properties are set as follows:

- vendor: DEC
- model\_num: RRD40

These setting eliminate the problem. The VMS 7.3 device driver seems to have issues with the RRD42 device.

## 5.8 HALT ON GUEST O/S BOOT

We occasional see halts on boot of the guest O/S, particularly with older O/S releases. These are typically consistent with behavior on real hardware.

### 5.8.1 XDELTA not loaded

The halt is similar under OpenVMS and Tru64 UNIX, in that an *XDELTA not loaded* message is displayed. The solution is to issue an **INIT** command at the console prompt to clear the problem. The example below depicts the problem during an OpenVMS boot.

```

>>>b
(boot dka0.0.0.6.0 -flags 0)
block 0 of dka0.0.0.6.0 is a valid boot block
reading 904 blocks from dka0.0.0.6.0
bootstrap code read in
base = 1f2000, image_start = 0, image_bytes = 71000
initializing HWRPB at 2000
initializing page table at 1e4000
initializing machine state
setting affinity to the primary CPU
jumping to bootstrap code

      OpenVMS (TM) Alpha Operating System, Version V7.1

ff.halt code = 5
HALT instruction executed
PC = 110678
fe.fd.fc.fb.fa.f9.f8.breakpoint at PC 1108e0 desired, XDELTA not loaded
f7.f6.f5.
ef.df.ee.ed.ec.f4.eb.ea.e9.e8.e7.e6.....e5.
V7.0-9, built on Mar 18 1999 at 13:25:37
>>>

```

## 5.8.2 Unexpected exception/interrupt through vector 420

The *unexpected exception/interrupt through vector 420* problem typically occurs during the O/S boot process and is well documented in real Alpha hardware behavior. The system self corrects by rebooting, as shown in the example below.

```

ff.fe.fd.fc.fb.fa.f9.f8.f7.f6.f5.
ef.df.ee.ed.ec.f4.eb.ea.e9.e8.e7.e6.....e5.
V7.0-9, built on Mar 18 1999 at 13:25:37

CPU 0 booting

(boot dka200.2.0.6.0 -flags 0)
block 0 of dka200.2.0.6.0 is a valid boot block
reading 1226 blocks from dka200.2.0.6.0
bootstrap code read in
base = 1f2000, image_start = 0, image_bytes = 99400
initializing HWRPB at 2000
initializing page table at 1e4000
initializing machine state
setting affinity to the primary CPU
jumping to bootstrap code
unexpected exception/interrupt through vector 420
process idle, pcb = 001159D0

pc: 00000000 00116A24  ps: 00000000 00001F04
r2: 00000000 001112A0  r5: 00000000 00001F04
r3: 00000000 00022650  r6: 00000000 00001259
r4: 00000000 000EE658  r7: 00000000 0000000A

exception context saved starting at 00116900

GPRs:
0: 00000000 00000000 16: 00000000 00116A08
1: 00000000 000001F4 17: 00000000 00006000
2: 00000000 000ED330 18: 00000000 000384C0

```

```

3: 00000000 00076CC0 19: 00000000 0012DD10
4: 00000000 000EE658 20: 00000000 0012DD10
5: 00000000 00038B88 21: 00000000 00000000
6: 00000000 00001259 22: 00000000 00116A08
7: 00000000 0000000A 23: 00000000 00000001
8: 00000000 00110670 24: 00657174 00000000
9: 00000000 00110678 25: 00000000 00000001
10: 00000000 000D0DE8 26: 00000000 00116A20
11: 00000000 00000001 27: 00000000 00111940
12: 00000000 001159D0 28: 00000000 00038BD8
13: 00000000 00000010 29: 00000000 00000000
14: 00000000 00000011 30: 00000000 00116A40
15: 00000000 00000000

```

dump of active call frames:

```

breakpoint at PC 1108e0 desired, XDELTA not loaded
ff.fe.fd.fc.fb.fa.f9.f8.f7.f6.f5.
ef.df.ee.ed.ec.f4.eb.ea.e9.e8.e7.e6.....e5.
V7.0-9, built on Mar 18 1999 at 13:25:37

```

CPU 0 booting

```

(boot dka200.2.0.6.0 -flags 0)
block 0 of dka200.2.0.6.0 is a valid boot block
reading 1226 blocks from dka200.2.0.6.0
bootstrap code read in
base = 1f2000, image_start = 0, image_bytes = 99400
initializing HWRPB at 2000
initializing page table at 1e4000
initializing machine state
setting affinity to the primary CPU
jumping to bootstrap code

```

OpenVMS (TM) Alpha Operating System, Version V8.3  
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## 5.9 NETWORK ISSUES

### 5.9.1 TCP Offload Features May Cause Network Instability

Many modern NICs include offload features to reduce the load on a host system CPU. These features occasionally cause problems with DECnet, TCP/IP, and System Communications Services (SCS) communications. If one of the following problems is encountered, try turning off TCP related offloading under the **Windows Configuration > Advance** tab for the NIC assigned to Avanti, starting with **TCP Connection Offloading**.

- Unable to establish communications to the Avanti NIC.
- Communications with Avanti are unstable (time outs, packet loss)
- Cluster communications are unstable (cluster time outs, packet loss)

### 5.9.2 Switch Drops DECnet and SCS Packets

Some modern switches drop DECnet and cluster (SCS) packets. Older Cisco Catalyst 4000 series switches were infamous for this. Often, when a switch gets busy, it will prioritize traffic

and start dropping packets it does not recognize. Many modern switches do not recognize SCS and DECnet packets.

If you encounter this problem, try the following solutions:

- If using a managed switch, limit speeds to 10/100 on the port assigned to the Avanti NIC.
- If using an unmanaged gigabit switch, try replacing it with a 10/100 switch.
- If the first two options do not work, try substituting a different switch brand or model.

In-house, we have had good luck with Netgear, Linksys, and HP Procurve equipment. However, we have had issues with Netgear gigabit equipment in clustered environments. Cisco and Netgear 10/100 switches have worked well with clusters.

### 5.9.3 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](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

### 5.9.4 ADMtek AN995 PCMCIA NIC

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

## 5.10 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.

## 5.11 PHYSICAL DEVICE ACCESS

When accessing a physical device like a CD-ROM, Avanti needs to run from an account with administrator rights.

## 5.12 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.

## 5.13 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**."

## 5.14 JIT MEMORY ERROR

If running on a Windows host system equipped with more than 32GB of memory and the following error is encountered, set the `jit_memory` parameter in the JIT advanced properties to 2GB.

```
Unable to reserve JIT buffer area: error 87: The parameter is incorrect.
```

## 5.15 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.

### 5.15.1 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.

AlphaVM license facilities do not affect FreeAXP.

## 5.16 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 running into 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, or disconnecting and reconnecting to the AnywhereUSB device using its configuration utility.

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.

## 5.17 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.

## 5.18 CHARON IDLE LOOP SUPPORT

Avanti 1.0.6.271 and subsequent releases support the Charon idle loop. 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$V_LOAD_SYS_IMAGES`) prevents `SYSS$IDLE` from being loaded during boot.