

# Teradici APEX™ 2800 Server Offload Card Administrator's Guide

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## Revision History

Version	Date	Description
1	Jan 27, 2012	Initial release

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## Definitions

Definition	Description
APEX	Accelerated PCoIP EXperience
CPU	Central Processing Unit
ECC	Error Correction Code
FPS	Frames Per Second
GPU	Graphics Processing Unit
GUI	Graphical User Interface presented by the client On Screen Display when not operating in a PC-over-IP session
Mpps	Mega pixels per second
OS	Operating System
OSD	On Screen Display
PCIe	Peripheral Component Interconnect Express
PC-over-IP®	Personal Computer over Internet Protocol
PCoIP®	Personal Computer over Internet Protocol (PC-over-IP)
PCoIP Zero Client	Desktop side of PC-over-IP system (that is, client). For example, PCoIP zero client or PCoIP integrated display
PCoIP Host	Host side of PC-over-IP system
QoS	Quality of Service
vCPU	Virtual CPU within a virtual machine
VDI	Virtual Desktop Infrastructure
VIB	VMware vSphere Installation Bundle
VM	Virtual Machine
VPN	Virtual Private Network
Zero Client	See PCoIP zero client

# 1 Introduction

The Teradici APEX™ 2800 server offload card provides hardware-accelerated PCoIP® image encoding for server-hosted VMware View™ virtual desktops (often referred to as Virtual Desktop Infrastructure or VDI). Available as a standard PCI Express (PCIe) expansion card for industry-standard servers, the APEX 2800 card monitors the graphical demands of VDI displays and automatically offloads the PCoIP encoding tasks of the most demanding displays from the vCPUs to the APEX 2800 card.

As demands change, the card seamlessly and automatically shifts between hardware encoding on the APEX 2800 card and software encoding on the virtual desktops' vCPU(s). This lets the APEX 2800 card support a large number of virtual desktops while providing optimal use of resources. The APEX 2800 server offload card can offload 64 displays running at a maximum resolution of 1920 x 1200 and can monitor up to four displays per virtual machine.

**Note:** Each virtual machine display is monitored separately. The number of displays offloaded may vary based on screen resolution and display activity.

## 1.1 Benefits

- Protected end-user experience from pixel-encoding CPU peaks
- Increased VDI consolidation ratios per server
- Full integration into VMware View and managed through View Administrator
- Simple install and setup

For more details, see <http://www.teradici.com/pcoip/pcoip-products/pcoip-server-offload-card.php>.



## 2 System Requirements

The APEX 2800 card can be used in virtual desktop environments that meet the following system requirements.

### 2.1 Virtual Desktop Server Platform

- Server platform with an available PCI Express (PCIe) x8, full height, half length compatible card slot
- ESXi 4.1 Update 1 build 348481, 4.1 Update 2 build 502767
- VMware View 4.6 or View 5.0
- Supported virtual machine operating systems:
  - Windows 7<sup>®</sup> 32-bit/64-bit
  - Windows Vista<sup>®</sup> 32-bit/64-bit
  - Windows XP<sup>®</sup>
- Maximum of two APEX 2800 cards per server for 128 displays being offloaded

To get the latest drivers, register at <http://techsupport.teradici.com>

### 2.2 Client

- PCoIP zero clients with firmware 3.5 or later
- VMware View 4.6 clients or later
- Displays with a resolution of 1920 x 1200 or less (displays with a higher resolution setting are not eligible for offload with release 1.0)

### 2.3 Network

The PCoIP protocol provides a real-time delivery of a rich user desktop experience. To ensure a responsive desktop, the PCoIP protocol must be deployed across a properly architected virtual desktop network infrastructure that meets bandwidth, QoS, latency and packet-loss requirements. For more details, see the *PCoIP Protocol Virtual Desktop Network Design Checklist* TER1105004 document at <http://techsupport.teradici.com>.

## 3 Installation and Configuration

This section steps you through the process to set up and configure the APEX 2800 card.

### Warning:

Power down and disconnect devices from AC power before handling them. Failure to do this can result in personal injury or equipment damage. Some circuitry on the server PC can continue to operate even though the front panel power switch is off.

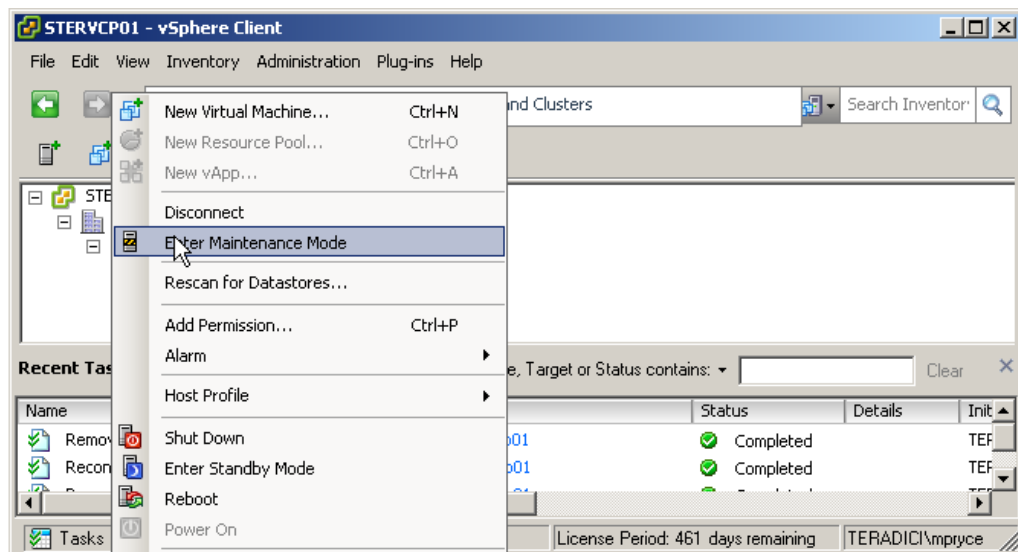
Ensure you observe correct anti-static handling to avoid potential ESD damage to the card.

### 3.1 Before you Begin

1. Get the latest drivers by registering at the Teradici support website at: <http://techsupport.teradici.com>.
2. Download the APEX 2800 drivers to a convenient PC.

### 3.2 Installing the APEX 2800 Card

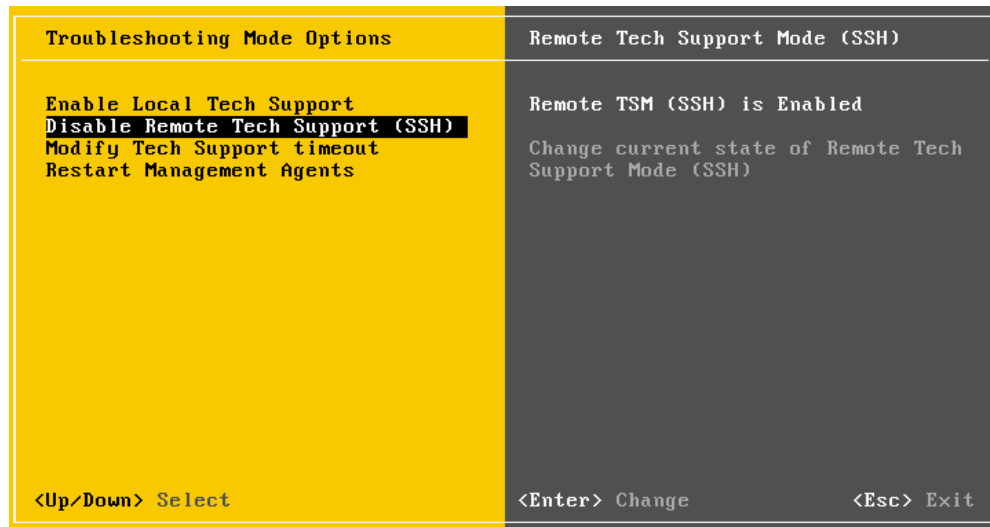
1. Make sure all virtual machines hosted by the server are powered down or migrated to another server.
2. In the VMware vSphere™ client, right-click on the ESXi server in the inventory, and then select **Enter Maintenance Mode**.



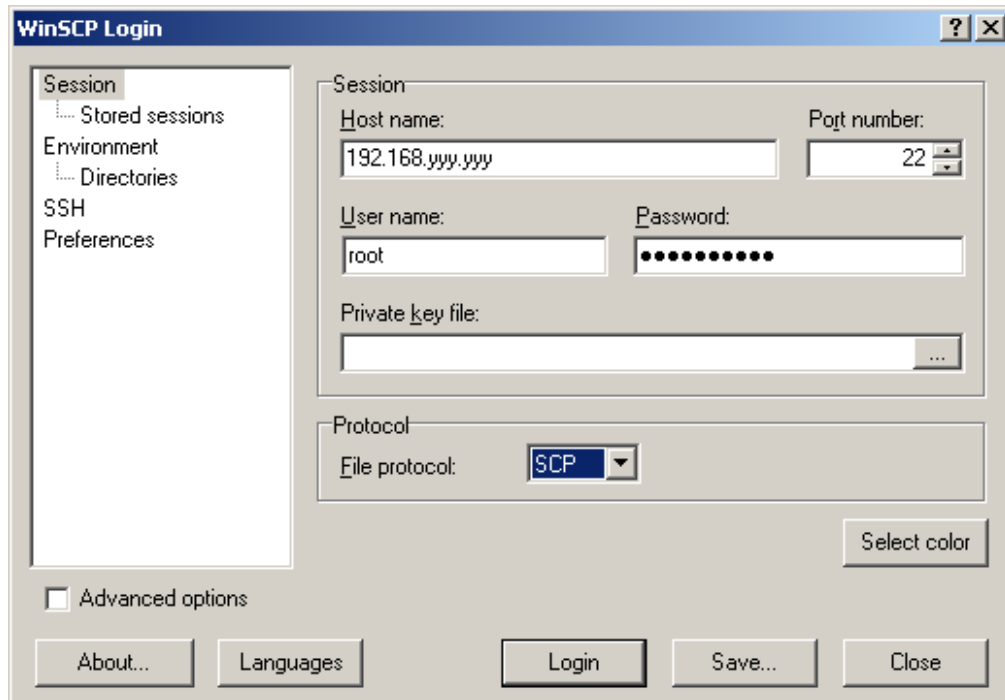
3. Make sure the server is turned off and disconnected from the AC power.
4. Insert the APEX 2800 card into an available PCI Express slot and secure the metal bracket.
5. Plug the server into a surge-protected AC outlet, and then power it on.

### 3.3 Installing the ESXi Driver Package

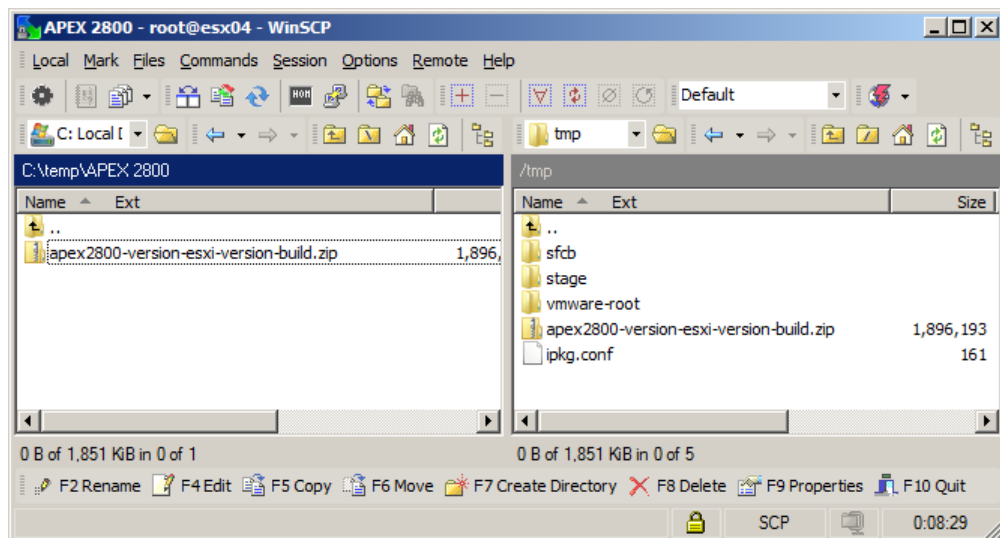
1. Enable remote login on the VMware ESXi server:
  - a. Press **F2** to enter customization.
  - b. Enter a username and password.
  - c. Select **Troubleshooting Mode Options -> Enable Remote Tech Support (SSH)**.



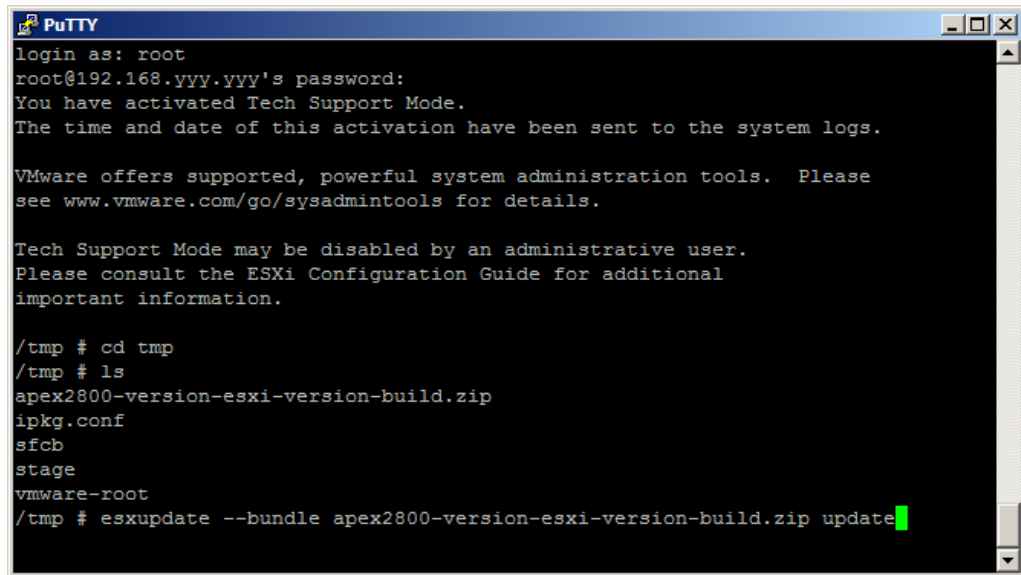
2. Copy the driver package from your PC to the ESXi server using secure copy.
  - a. Download and install WinSCP on your PC.
  - b. Start WinSCP and specify your ESXi server host name (IP address), username and password.
  - c. Make sure the file protocol is SCP.
  - d. Click **Login**.



- e. Drag the apex2800-version-esxi-version-xxxxx.zip package to the /tmp folder in your ESXi server.



3. Connect to the ESXi server using an SSH client (e.g., PuTTY) from your PC and install the driver package:
  - a. Navigate to the /tmp folder.
  - b. Type: `esxupdate --bundle apex2800-version-esxi-version-xxxxxx.zip update`



```

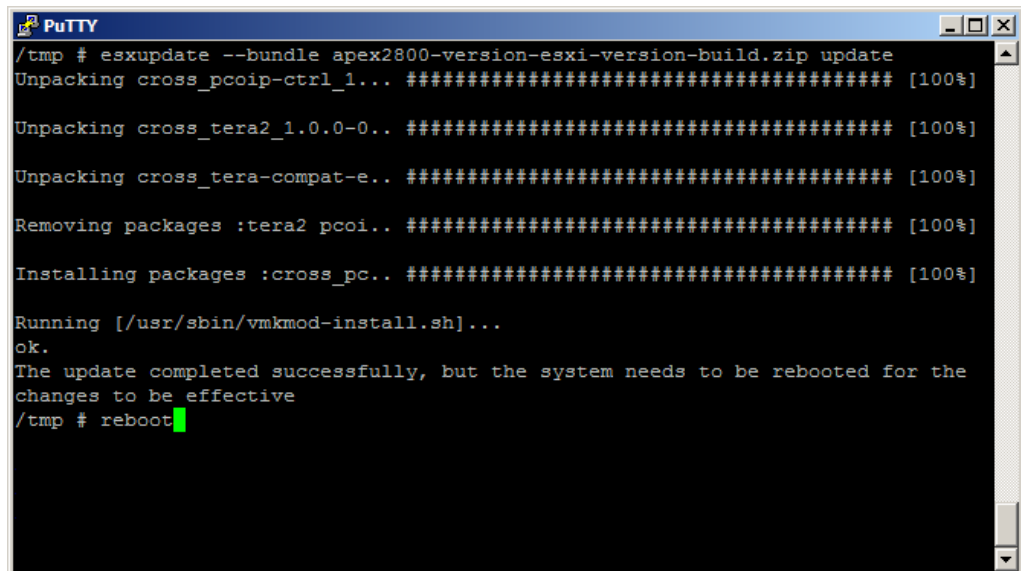
PuTTY
login as: root
root@192.168.yyy.yyy's password:
You have activated Tech Support Mode.
The time and date of this activation have been sent to the system logs.

VMware offers supported, powerful system administration tools. Please
see www.vmware.com/go/sysadmintools for details.

Tech Support Mode may be disabled by an administrative user.
Please consult the ESXi Configuration Guide for additional
important information.

/tmp # cd tmp
/tmp # ls
apex2800-version-esxi-version-build.zip
ipkg.conf
sfcb
stage
vmware-root
/tmp # esxupdate --bundle apex2800-version-esxi-version-build.zip update
    
```

The following message appears when the installation finishes:



```

PuTTY
/tmp # esxupdate --bundle apex2800-version-esxi-version-build.zip update
Unpacking cross_pcoip-ctrl_1... ##### [100%]

Unpacking cross_tera2_1.0.0-0.. ##### [100%]

Unpacking cross_tera-compat-e.. ##### [100%]

Removing packages :tera2 pcoi.. ##### [100%]

Installing packages :cross_pc.. ##### [100%]

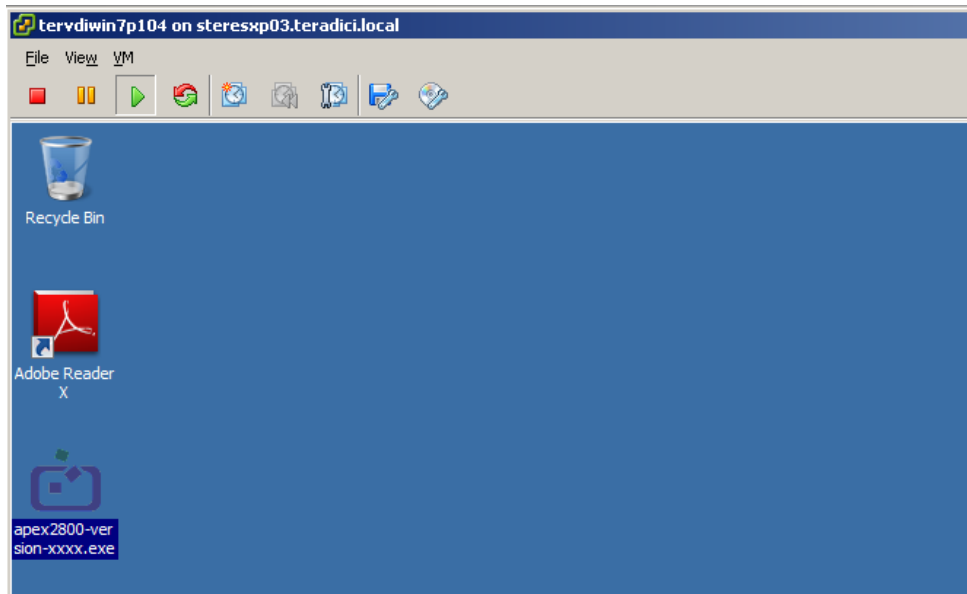
Running [/usr/sbin/vmkmmod-install.sh]...
ok.
The update completed successfully, but the system needs to be rebooted for the
changes to be effective
/tmp # reboot
    
```

4. Reboot the ESXi server.
5. From the vSphere Client, right-click the **ESXi server** in the inventory, and then select **Exit Maintenance Mode**.

### 3.4 Installing the Virtual Machine Driver

You must install the APEX 2800 virtual machine driver on each virtual machine.

1. Power up the virtual machine.
2. Open a console window to the virtual machine from the vSphere™ client.

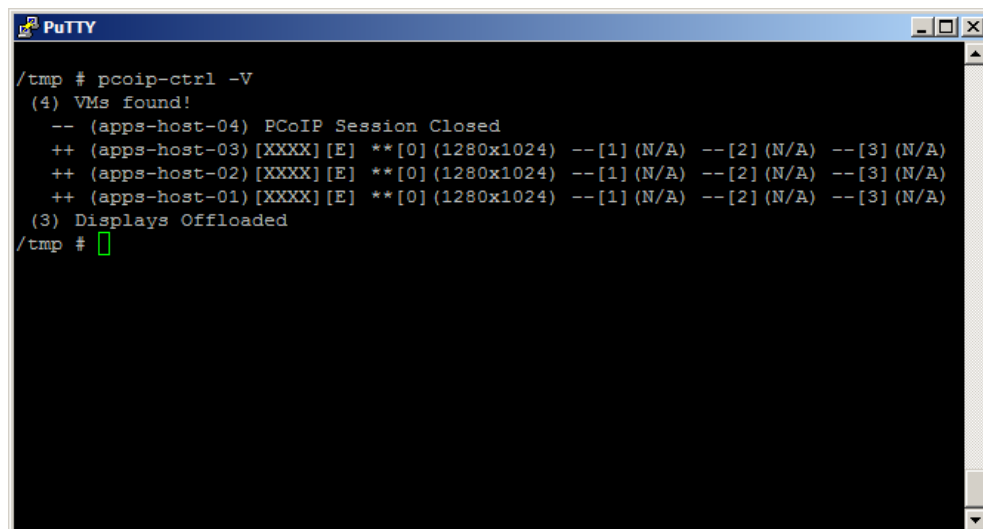


- Run the apex2800-version-xxxxxx.exe on the virtual machine and follow the onscreen steps.

**Note:** You cannot install this package from within a PCoIP session to the virtual machine. You must install it from the vSphere VMConsole.

- After the installation finishes, choose to reboot the machine later.

**Important Note:** Make sure to power the virtual machine off and then back on again. This ensures that the ESXi inspects the updated virtual machine image.



```

/tmp # pcoip-ctrl -V
(4) VMs found!
-- (apps-host-04) PCoIP Session Closed
++ (apps-host-03) [XXXX] [E] ** [0] (1280x1024) -- [1] (N/A) -- [2] (N/A) -- [3] (N/A)
++ (apps-host-02) [XXXX] [E] ** [0] (1280x1024) -- [1] (N/A) -- [2] (N/A) -- [3] (N/A)
++ (apps-host-01) [XXXX] [E] ** [0] (1280x1024) -- [1] (N/A) -- [2] (N/A) -- [3] (N/A)
(3) Displays Offloaded
/tmp # █
    
```

**Note:** You must power off the virtual machine. A simple reboot does not cause the driver to take effect.

## 3.5 Verifying the Policy Settings

In View Connection Server, the pool policies have an option for enabling and disabling PCoIP hardware acceleration. Verify that this option is enabled for any custom policies. Also ensure that PCoIP hardware acceleration is enabled in the **Global Group Policy** (if any policies inherit from it).

## 3.6 Installing Additional APEX 2800 Cards

When additional APEX 2800 cards are installed on the same server, they act as a single resource and can automatically offload additional displays. To install an additional card, repeat the following installation steps:

[See "Installing the APEX 2800 Card" on page 10](#)

[See "Viewing the Status of the APEX 2800 Card" on page 24](#)

## 4 Administration

This section describes the management functions for your APEX 2800 card(s).

To manage the APEX 2800 card, use View Administrator. It does not require the installation of any other management tool.

### 4.1 Setting Priority Levels

You can refine how the APEX 2800 card prioritizes display offloads when the card is operating at full capacity. By assigning one of five available priority levels to the global pool, a specific desktop pool, or an individual user in View Connection Server, you can apply your knowledge about the known graphic demands of existing desktop pools to the APEX 2800 card's prioritization of display offloads.

**Note:** In VMware View 4.6 and 5.0, the default priority level for PCoIP hardware acceleration is set to Medium.

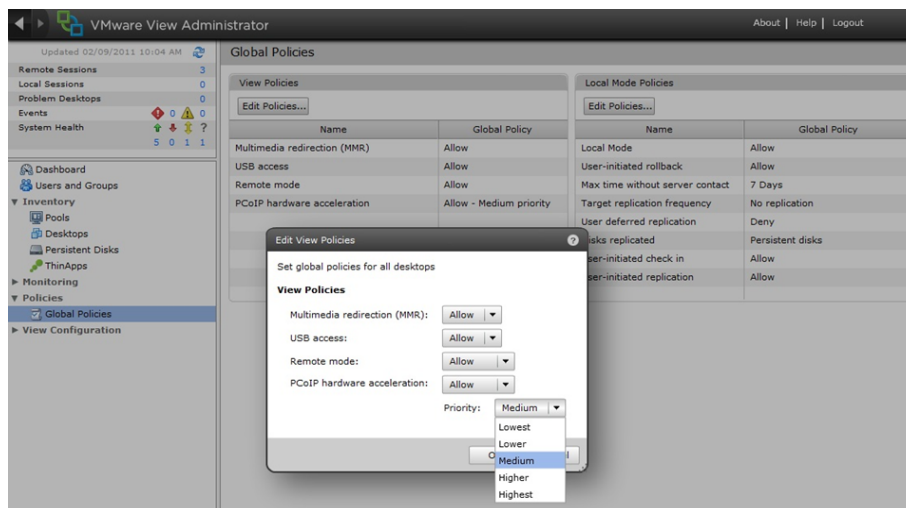
This ensures that displays belonging to higher priority desktop pools are encoded on the APEX 2800 card processor before lower priority displays, regardless of the amount of pixel activity being generated by the higher priority desktops. To change the priority from Medium to another level, follow the steps in the next sections.

#### 4.1.1 Assigning the Priority to the Global Pool

To change the priority setting for your global pool:

1. From the View Connection Server, select **Policies > Global Policies**.

The **View Policies** window appears:



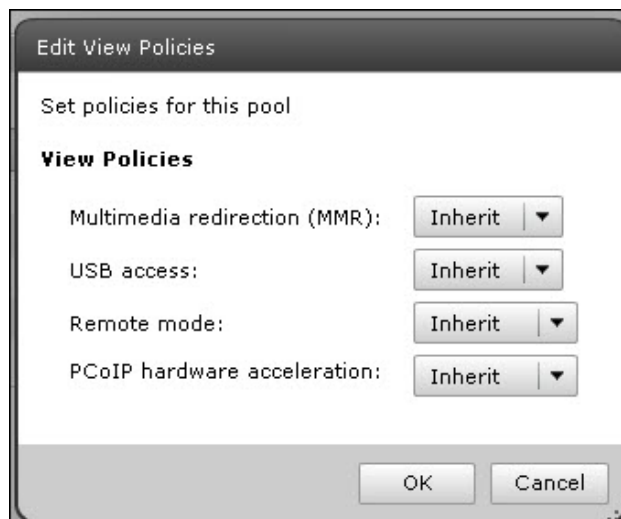
2. The **PCoIP hardware acceleration** drop-down box is set to **Allow** (by default). You can change the **Priority** setting to any of the available options. This change is applied to your desktop pools that currently are set up to inherit the global setting.



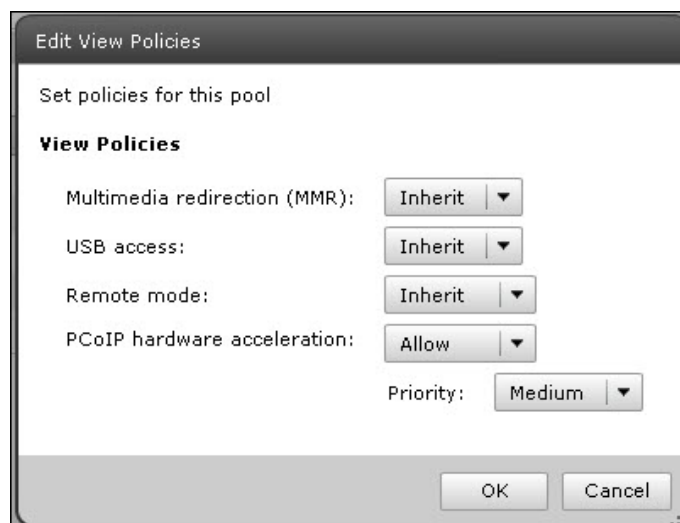
#### 4.1.2 Assigning the Priority to a Desktop Pool

To assign a priority level to a desktop pool:

1. From the View Connection Server, select **Inventory -> Pools**.
2. Double-click the ID of the applicable desktop pool, and then click the **Policies** tab.
3. Configure session policies for the pool.
  - To configure general session policies, click **Edit Policies** from the **View Policies** window.
  - To configure local session policies for the pool, click **Edit Policies** from the **Local Mode Policies** window.



4. From the **PCoIP hardware acceleration** drop-down box, select **Allow**. The **Priority** drop-down box becomes enabled. Change the **Priority** setting as required.

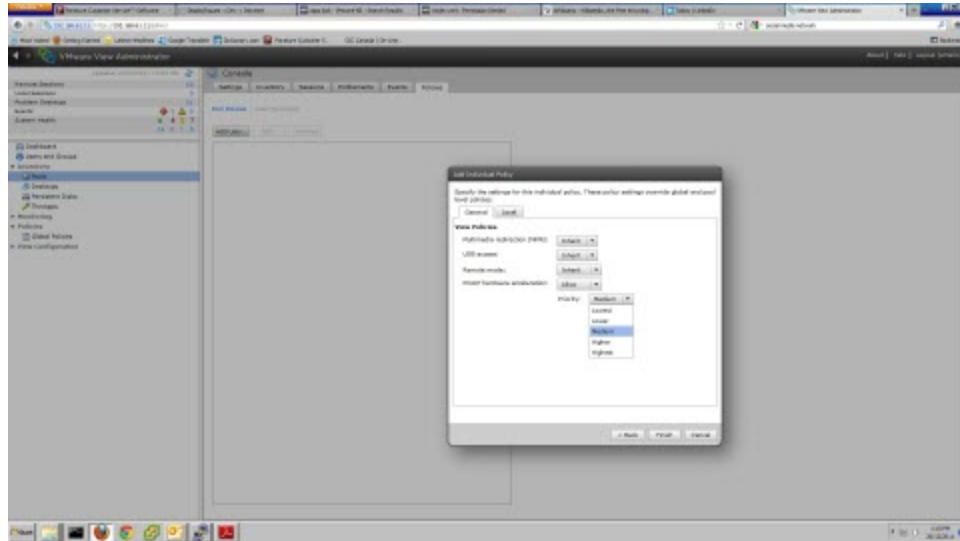


5. Click **OK** to save your changes. The new priority setting is applied to all users within the desktop pool (except any users that have a **Priority** setting applied to them individually).

### 4.1.3 Assigning the Priority to an Individual End User

To assign a priority to a specific end user within a desktop pool:

1. From the View Connection Server, select **Inventory > Pools**.
2. Click **User Overrides**.
3. Select the user to which you want to apply the priority setting.
4. Click **Next**. The **Edit View Policies** window appears.



5. Set the **PCoIP hardware acceleration** field to **Allow**.
6. Change the **Priority** setting as required.

## 4.2 Session Variables

Most of the PCoIP session settings configured in View are maintained by the APEX 2800 card. The following table shows common session settings and if they are supported by the APEX 2800 card.

Session Setting	Supported by the APEX 2800 Card
<b>PCoIP Image Quality Levels:</b>	
<ul style="list-style-type: none"> <li>• Minimum Image Quality</li> </ul>	<ul style="list-style-type: none"> <li>• Yes</li> </ul>
<ul style="list-style-type: none"> <li>• Maximum Initial Image Quality</li> </ul>	<ul style="list-style-type: none"> <li>• Yes</li> </ul>
<ul style="list-style-type: none"> <li>• Maximum Frame Rate</li> </ul>	<ul style="list-style-type: none"> <li>• No. This is set to 24 frames per second (fps) which is the default for VMware View using the PCoIP protocol.</li> </ul>
Maximum PCoIP Session Bandwidth	Supported dynamically receiving the bandwidth limit values from the PCoIP software in VMware View.
PCoIP Session Bandwidth Floor	Supported dynamically receiving the bandwidth floor from the PCoIP software in VMware View.

Session Setting	Supported by the APEX 2800 Card
Turn Off Build-to-Lossless	Yes
PCoIP Image Caching Size	No (but will be supported in a future release)

## 4.3 APEX 2800 Command Line Interface

The APEX 2800 card supports a command line interface from the ESXi, which you can use to configure and monitor your APEX 2800 cards.

**Note:** All configured settings, with the exception of the offload indicator setting, appear in the PCoIP Server Logs.

From the ESXi CLI:

```
pcoip-ctrl [-d<device number>][-x][-e][-L log level][-I][-V][-O][-P
"name value"][-X name]
```

Null Switches	Output the command usage information	
-d	Specify the device number (bus number) to control	
-x	Disable the APEX 2800 device specified using the -d option	
-e	Enable the APEX 2800 device specified using the -d option	
-I	Output the general driver and device information	
-V	Output virtual machine and display usage information	
-C	Output all firmware log event categories and current levels	
-O	Output all virtual machine properties	
-P <property_name property_value)	Set the specified property value. For more details about the Property setting, see <a href="#">"Setting APEX 2800 Card Properties"</a> .	
	offload_indicator	Enable/disable the red dot offload indicator if eligible. (Disabled by default)
	bw_enable_threshold bw_disable_threshold	Enable/disable network bandwidth thresholds for offload canceling for View 5.0 clients
-X <property_name>	Remove the specified property	
-L <log level>	Set the default log level in the APEX 2800 ESXi driver or firmware:	
	--0	CRITICAL log level
	--1	ERROR log level
	--2	INFO log level

### 4.3.1 Enabling/Disabling the APEX 2800 Card

You can enable or disable the APEX 2800 card using the pcoip-ctrl command from the ESXi CLI.

**Note:** The VM must be eligible for offloading for these settings to take effect.

#### Disable the APEX card

Example: To disable the APEX 2800 card in bus number 6, type ESX>pcoip-ctrl -d 6 -x

### Enable the APEX 2800 card

Example: To enable the APEX 2800 card in bus number 6, type `ESX>pcoip-ctrl -d 6 -e`

## 4.3.2 Working with the Property Settings

This section describes the property values available in the APEX 2800 card. For the full list of available commands, see section 4.3.

APEX 2800 Property	Description
offload_indicator	<p>Set the red dot display offload indicator option.</p> <p><b>Operation:</b> Provides a way to see if a display is offloaded at the end user's display by a small dot overlay appearing at the top left corner of the screen.</p> <ul style="list-style-type: none"> <li>Red dot: The display is offloaded using PCoIP hardware compression in the APEX 2800 card.</li> <li>Blue dot: The display is using PCoIP software compression and is not offloaded.</li> </ul> <p><b>Property value:</b></p> <ul style="list-style-type: none"> <li>1: Enable the offload indicator</li> <li>2: Disable the offload indicator</li> </ul> <p><b>Default:</b> Disabled</p>
bw_disable_threshold bw_enable_threshold	<p>Set the enable/disable network bandwidth threshold for offload canceling. To view the enable or disable state for a VM, type <code>pcoip-ctrl -V</code>.</p> <p><b>Note:</b> This setting only applies for VMware View 5.0 clients (or later).</p> <p><b>Operation:</b> When the network bandwidth for a session goes below the threshold, display offloading is canceled. Once the network bandwidth is above the threshold, the display(s) are eligible for offloading again based on the VM priority and APEX 2800 card resource availability.</p> <p><b>Property value:</b> 0 to any bandwidth number</p> <p><b>Usage:</b> At lower network bandwidths, there is a smaller load on the APEX 2800 card and as a result, less offload benefit. Automatically canceling display offload below a network threshold helps maximize the benefit of the APEX 2800 card. Also, automatic display offload canceling below a network threshold lets the session take advantage of WAN bandwidth optimization features in PCoIP software such as client image caching (if available on the client).</p> <p><b>Note:</b> The APEX 2800 card does not currently support client image caching. This will be added in a future APEX 2800 software release (within the second half of 2012).</p> <p><b>Default:</b></p> <p>Session bandwidth threshold for offload canceling: 800 Kbps Session bandwidth threshold for offload enabling : 1 Mbps</p>

### Setting a Property

To set an APEX 2800 card feature property: `ESX> pcoip-ctrl -P <property_name property_value>`

Example (to enable the offload indicator):

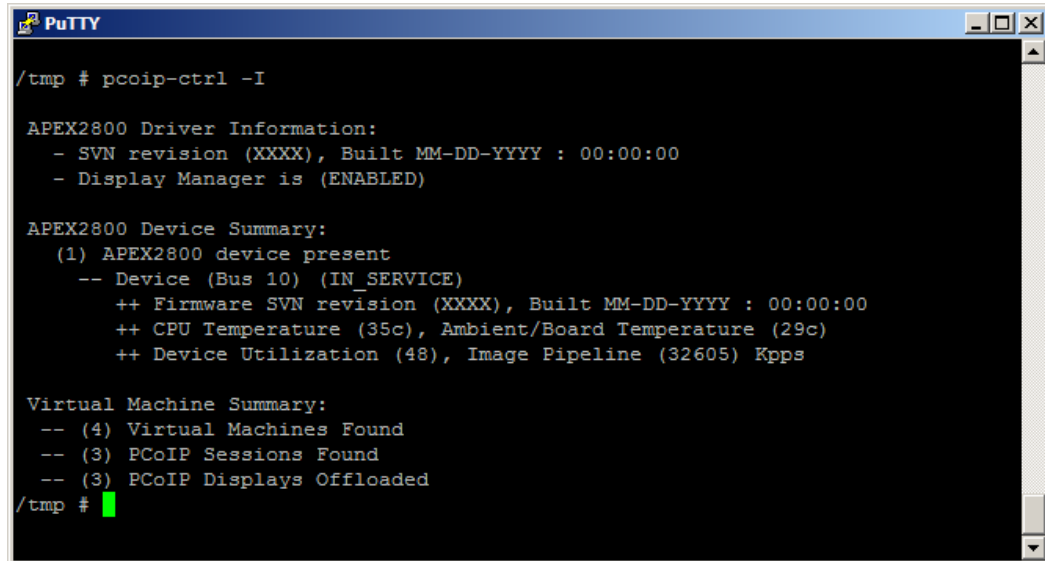
```
ESX>pcoip-ctrl -P "offload_indicator 1"
```

Example (to disable the offload indicator):

```
ESX>pcoip-ctrl -P "offload_indicator 0"
```

### 4.3.3 Displaying General Device and Driver Information

To display general information about the APEX 2800 card and ESXi driver, type `pcoip-ctrl -I`.



```

/tmp # pcoip-ctrl -I

APEX2800 Driver Information:
- SVN revision (XXXX), Built MM-DD-YYYY : 00:00:00
- Display Manager is (ENABLED)

APEX2800 Device Summary:
(1) APEX2800 device present
-- Device (Bus 10) (IN_SERVICE)
++ Firmware SVN revision (XXXX), Built MM-DD-YYYY : 00:00:00
++ CPU Temperature (35c), Ambient/Board Temperature (29c)
++ Device Utilization (48), Image Pipeline (32605) Kpps

Virtual Machine Summary:
-- (4) Virtual Machines Found
-- (3) PCoIP Sessions Found
-- (3) PCoIP Displays Offloaded

/tmp #
    
```

### 4.3.4 Setting the Log Level for the APEX 2800 ESXi Driver and Firmware

The APEX 2800 ESXi driver and firmware support multiple levels of logging to balance sufficient data, system performance, and log file size. There are three log levels that are set in both the APEX 2800 ESXi driver as well as in the APEX 2800 card firmware. These levels include:

Log Level	Description
0-Critical	The system can no longer function correctly. This log level only shows the critical event messages in the log.
1-Error	This is the default log level. It includes critical and error event message but does not include Information messages.
2-Info	This event log shows all log levels.

#### Example

```
ESX>pcoip-ctrl -L1
```

Note: We recommend you use a syslog server to ensure necessary information is available in the event of an issue. See section 5.1 for more details.

### Displaying Firmware Log Event Categories

To view the current level of event messages that appear in your error log, type `pcoip-ctrl -C -d <device number>`.

Example:

```
pcoip-ctrl -C -d 4
```

### 4.3.5 Displaying the APEX 2800 Properties for a VM

To view the properties for a virtual machine, type `pcoip-ctrl -O`.

Example:

```
bw_disable_threshold ==> 0
bw_enable_threshold ==> 100
offload_indicator ==> 1
```

## 4.4 Monitoring the VDI Server Load

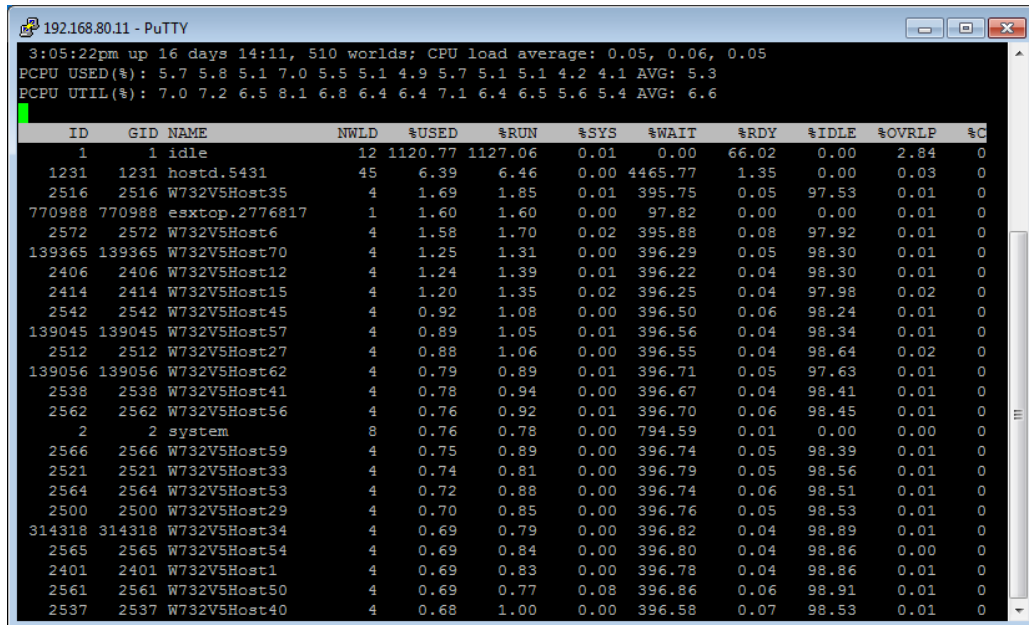
### 4.4.1 ESXtop PCPU

You can use `esxtop` to monitor the physical CPU loading for a VDI server by using the PCPU statistics. While you can do this live, we recommend you run `esxtop` in batch mode to save the values to a file.

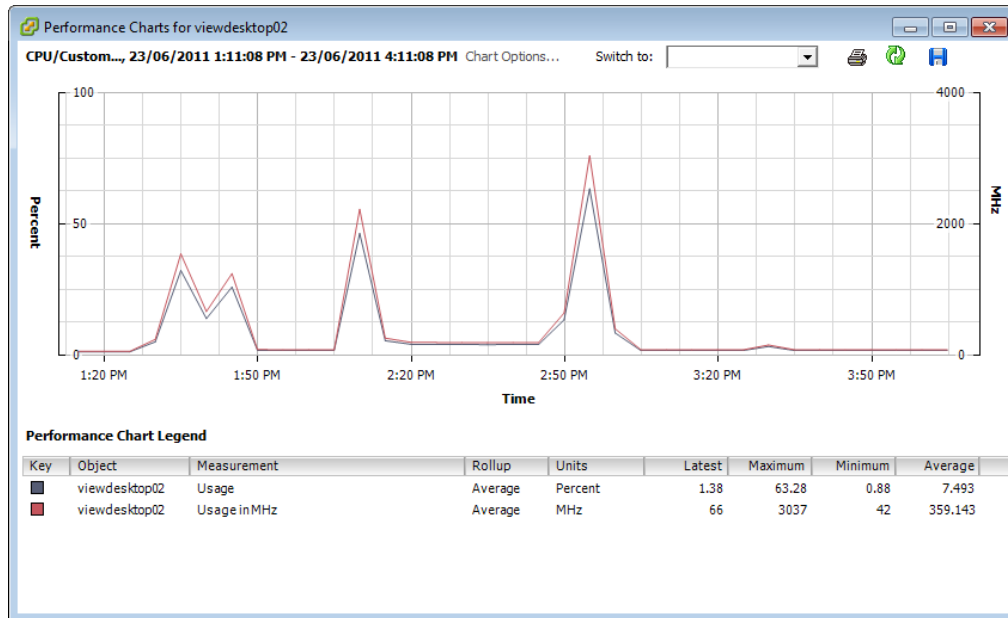
Use the `esxtop` command: `esxtop -b > myfile.csv` to save server performance information to a file. You can view this with Microsoft Excel® or another applicable tool. For instructions on the `esxtop` batch mode, see

<http://pubs.vmware.com/vi301/resmgmt/wwhelp/wwhimpl/common/html/wwhelp.htm?context=resmgmt&file=esxtop.14.10.html>.

The PCPU values appear at the top part of the window (as shown in the following figure):



#### 4.4.2 vCenter Performance Tab

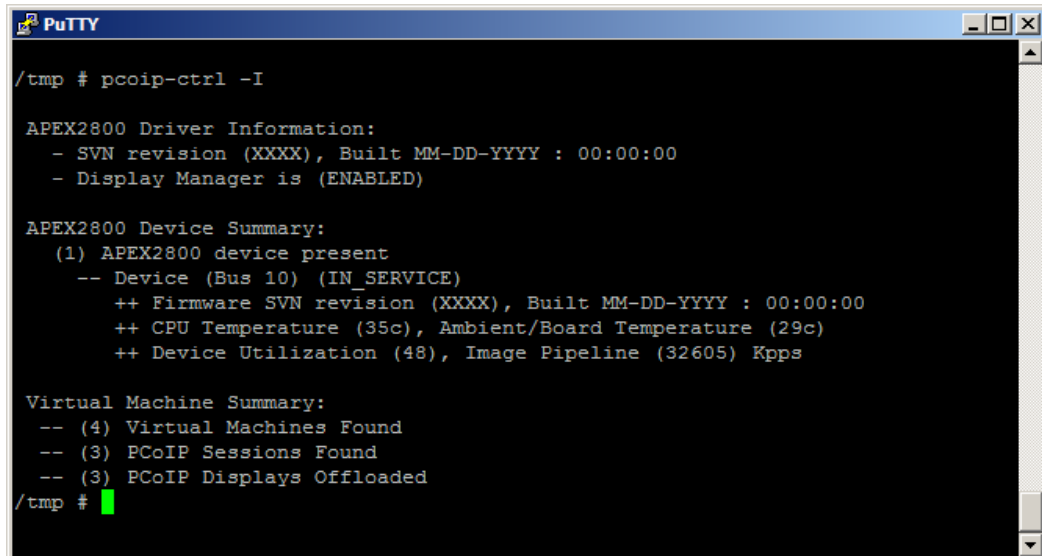


Note: While you can monitor the server CPU resources through vCenter, it is not recommended for benchmarking the APEX 2800 card since the usage is only updated every 20 seconds. This timing misses spikes in server CPU loads.

## 4.5 Viewing the Status of the APEX 2800 Card

When the installation and configuration of the APEX 2800 card is complete, you can verify the working status of the APEX 2800 card by entering the following command in your SSH session: `ESXi> pcoip-ctrl -I`

This outputs the following:



```

PuTTY

/tmp # pcoip-ctrl -I

APEX2800 Driver Information:
- SVN revision (XXXX), Built MM-DD-YYYY : 00:00:00
- Display Manager is (ENABLED)

APEX2800 Device Summary:
(1) APEX2800 device present
-- Device (Bus 10) (IN_SERVICE)
++ Firmware SVN revision (XXXX), Built MM-DD-YYYY : 00:00:00
++ CPU Temperature (35c), Ambient/Board Temperature (29c)
++ Device Utilization (48), Image Pipeline (32605) Kpps

Virtual Machine Summary:
-- (4) Virtual Machines Found
-- (3) PCoIP Sessions Found
-- (3) PCoIP Displays Offloaded

/tmp # █
    
```

The line containing "(1) APEX2800 device present" indicates that the card is installed correctly.

Other information provided includes:

- Onboard temperatures (for both the processor and board)
- Device utilization: This shows the current activity for the card. The value ranges from 0 to 99 with 0 indicating idle.
- Image pipeline: The rate at which the card is processing pixels (measured in kilopixels per second).

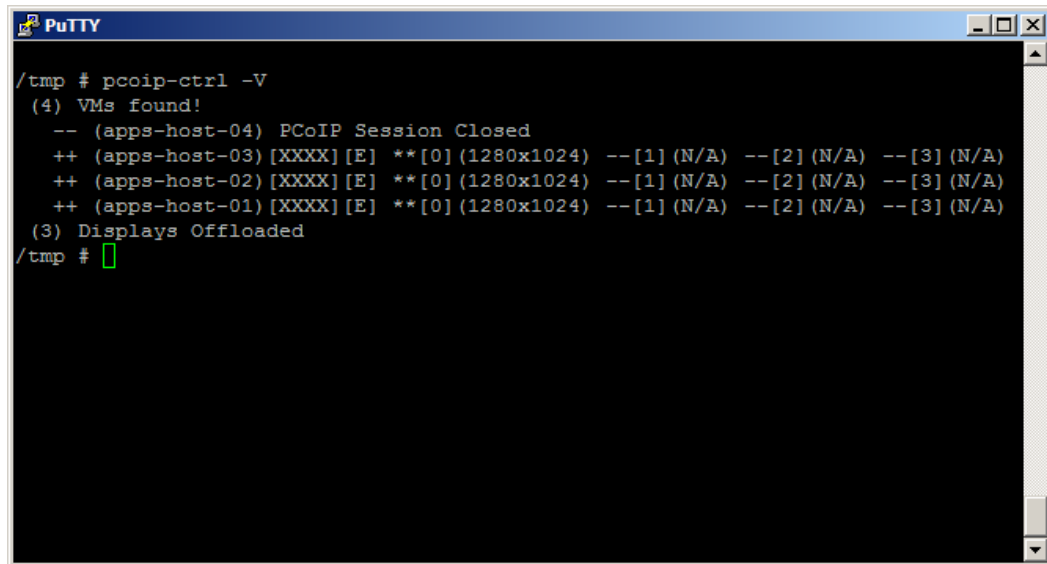
## 4.6 Viewing the Usage and Monitoring Status of the Virtual Machines

You can view information about each virtual machine which the APEX 2800 card is currently monitoring. The following command provides information about each display and if a particular display is offloaded:

```
ESXi>pcoip-ctrl -V
```

As shown in the following figure:





```

/tmp # pcoip-ctrl -V
(4) VMs found!
-- (apps-host-04) PCoIP Session Closed
++ (apps-host-03) [XXXX] [E] **[0] (1280x1024) --[1] (N/A) --[2] (N/A) --[3] (N/A)
++ (apps-host-02) [XXXX] [E] **[0] (1280x1024) --[1] (N/A) --[2] (N/A) --[3] (N/A)
++ (apps-host-01) [XXXX] [E] **[0] (1280x1024) --[1] (N/A) --[2] (N/A) --[3] (N/A)
(3) Displays Offloaded
/tmp # █
    
```

**Legend:**

**(XX):** Number of displays currently offloaded. In the figure, there are three displays offloaded.

**(HostName) Unavailable:** (Not shown in the figure.) Indicates the VM does not have the APEX 2800 VM software installed and running.

**(HostName) PCoIP Session Closed:** Indicates the VM is not currently in an active PCoIP session. If APEX 2800 hardware acceleration is disabled for this user's VM in View Connection Server, this command also reports the PCoIP session as closed.

**(HostName)(APEX VM Driver build #) [E] \*\*[0](display #0 resolution) –[1](display #1 resolution)** (Not shown in the figure.):

- [E] Indicates the VM is either above the bandwidth threshold, or is connected to a client not capable of image caching.
- [D] Indicates the VM is connected to a PCoIP client that supports image caching, and the bandwidth available between the VM and PCoIP client is below the configurable bandwidth threshold.

*Note: The bandwidth threshold setting only applies to VMware View 5.0 (or later) clients.*

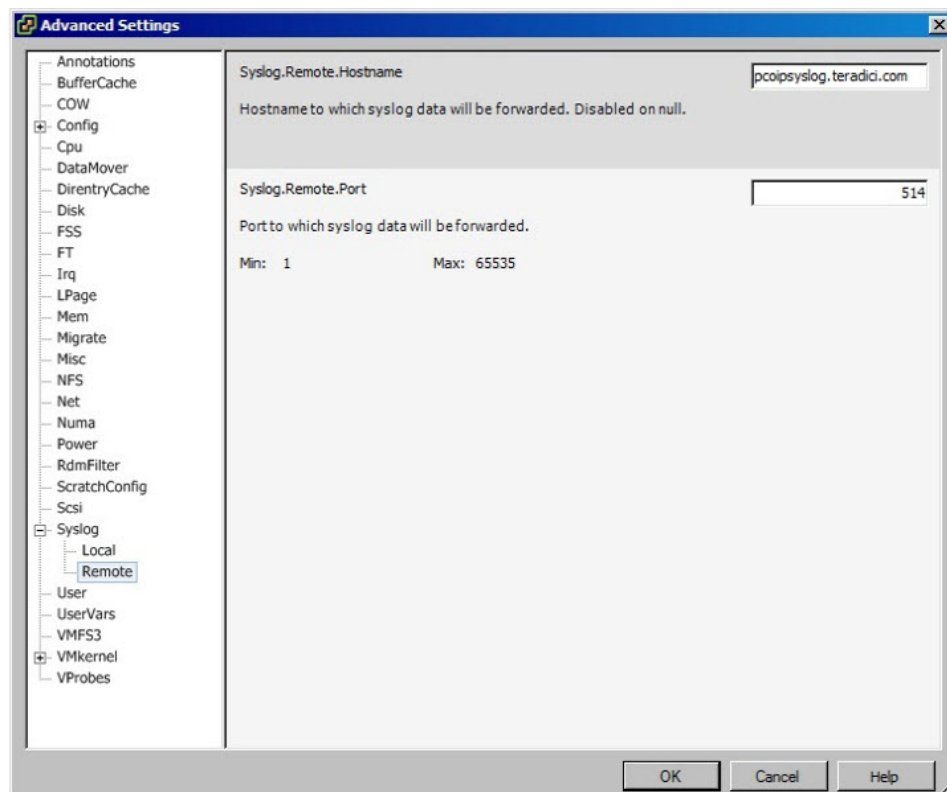
- \*\* indicates that particular display is offloaded
- -- indicates the display is not offloaded (uses PCoIP software encoding).

## 5 Troubleshooting

This section describes some troubleshooting procedures specific to the APEX 2800 card. For more details, see the Knowledge Base at <http://techsupport.teradici.com>.

### 5.1 Enabling a Syslog Server

It is important to enable a syslog server to capture the log data in the event of an issue. Due to the volume of information, the event logs are over-written quickly. Also, the logs can be lost during a reboot. Enabling a syslog server in the advanced settings of your ESXi host ensures necessary data is available for troubleshooting.



**Figure 4-1: ESXi Host Advanced Settings (Enabling a Syslog Server )**

If a syslog server is not available, you can move your logging to a non scratch directory by following the steps outlined in the following VMware KB:

<http://kb.vmware.com/selfservice/microsites/search.do?language=en-US&cmd=displayKC&externalId=1016621>

## 5.2 Determining the APEX 2800 Card Status

### 5.2.1 From an Administrative Console

To view the status of one, or multiple APEX 2800 cards, enter the following command in your SSH session:

```
pcoip-ctrl -I
```

For more information about pcoip-Ctrl -I command, see section 4.3.

### 5.2.2 At the User's Desk

If you have enabled the offload indicator, you can also determine if an individual display is offloaded by viewing the individual screen:

**Offloaded (using PCoIP hardware compression in the APEX 2800 card):** A small, red dot appears in the top left-hand corner of the screen.

**Not offloaded (using PCoIP software compression):** A small blue dot appears in the top left-hand corner of the screen.

**Note:** By default the offload indicator is disabled.



## 5.3 Identifying a Failed Card

Enter the following command in your SSH session:

```
pcoip-ctrl -I
```

If the output does not show information for your card or the number of devices present does not match the number of installed cards (maximum of two), then one or more APEX 2800 cards have failed.

For more information about the pcoip-ctrl -I command, see section 4.3.

## 6 Appendix A: VDI Server Platforms Tested

VDI server platforms tested to date:

- Dell R610
- Dell R710
- Dell 2970
- HP DL385G7
- HP DL585G7
- IBM x3650
- IBM x3690
- Cisco C200
- Cisco C250
- Cisco C260