Teradici PCoIP Hardware Accelerator for VMware Horizon View

Performance characteristics of the Teradici PCoIP Hardware Accelerator in a VMware Horizon View environment

Dell Wyse Solutions Engineering
February 2014
## Revisions

<table>
<thead>
<tr>
<th>Date</th>
<th>Description</th>
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<tbody>
<tr>
<td>February 2014</td>
<td>Initial release v.6.0</td>
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<tr>
<td>March 2014</td>
<td>Updated branding information v.6.1</td>
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The Teradici PCoIP Hardware Accelerator, formerly known as the Teradici APEX 2800 Server Offload Card, provides hardware-accelerated PCoIP image encoding for server-hosted VMware Horizon View virtual desktops (often referred to as Virtual Desktop Infrastructure, or VDI).

The Teradici PCoIP Hardware Accelerator provides consistent user experience and delivers higher frames per seconds to the remote endpoint by offloading PCoIP encoding tasks from the CPU. The Hardware Accelerator is only supported on VMware Horizon View back end systems.

The Hardware Accelerator monitors the graphical demands of displays and automatically offloads the PCoIP encoding tasks of the most demanding displays from the vCPUs to the Hardware Accelerator. To support multiple server types, the Hardware Accelerator is available in the form factors shown below. For all cards, the features and functionality are the same.

- **Full height**: Standard full height, half-length card that fits into a PCIe x8 or x16 slot (supports PCIe Gen 1.1 and 2.0)
- **Low profile (LP)**: Half height, half-length card that fits into a PCIe x4 slot (supports PCIe Gen 2.0 only)
- **MXM**: An MXM card for HP Gen8 blade servers
- **DXM-A by Amulet Hotkey**: A DXM-A card for Dell "M" series blade servers

The Hardware Accelerator monitors the graphical demands of all displays and dynamically offloads the image encoding of up to the most demanding 100 displays.

As demands change, the card will seamlessly and automatically shift between hardware encoding on the Hardware Accelerator and software encoding on the virtual desktop’s vCPU(s) ensuring the best user experience at all times.

The Teradici PCoIP Hardware Accelerator is the ideal complement to GPU implementation on VMware Horizon View (both vSGA and vDGA) as it results in higher VM density per server.
Test results

In order to evaluate the PCoIP Hardware Accelerator a custom Login VSI workload was created. This workload incorporated the medium workload from Login VSI and also included a script that called the Microsoft Fishbowl web page in order to drive the NVIDIA GRID K1 GPU usage.

The following tests were run with 84 VMs as that was the maximum density achieved (per CPU threshold) without the Hardware Accelerator card. With the Hardware Accelerator card enabled, CPU usage is reduced which can yield more desktops or handle individual workload spikes on the current workload number.

Each Virtual Desktop was given 512 MB VRAM for the duration of the tests.

The following graphs show the differences in host metrics when running the Login VSI tests with and without the Hardware Accelerator card enabled.

![ESXi Host CPU Performance](image)

**Figure 2** ESXi host CPU performance

Reduced CPU Usage when Hardware Accelerator is enabled and offloading desktops
Figure 3  ESXi host memory performance

Figure 4  ESXi host datastore performance
Figure 5  ESXi host network performance

Figure 6  Command prompt report indicating that all 84 desktops were successfully offloaded
Figure 7  User experience scatter plot graph with APEX 2800 enabled
Figure 8  User experience scatter plot graph with APEX 2800 disabled

Conclusion

It is clear from the graphs above that ESXi host CPU usage is reduced when the Teradici PCoIP Hardware Accelerator card is active. CPU usage is reduced from just over 80% to 70%. Other host metrics (i.e. network, datastore, and memory) seem largely unaffected.
Appendix – Configuration details

Hardware components

- Virtual desktops
  - Windows 7 64-bit
  - 2 x CPU
  - 4 GB RAM
- VMware compute host
  - 1 x Dell PowerEdge R720
  - ESXi 5.5
  - Intel Xeon CPU E5-2690 v2 @ 3.0 GHz
  - 256 GB RAM @ 1600 MHz
  - 10 x 146 GB 15K SAS HDD
  - Broadcom BCM5720 1 Gb NIC
  - PERC H710P RAID controller
  - 2 x NVIDIA GRID K1
  - Hardware Accelerator half height
- VMware management host
  - 1 x Dell PowerEdge R720
  - ESXi 5.5
  - Intel Xeon CPU E5-2690 @ 2.7 GHz
  - 128 GB RAM @ 1600 MHz
  - 10 x 146 GB 15K SAS HDD
  - Broadcom BCM5720 1 Gb NIC
  - PERC H710P RAID controller
- Network
  - 1 x Dell PowerConnect 6248 1 Gb Ethernet switch
- Performance monitoring
  - VMware vSphere Virtual Center 5.5
  - NVIDIA SMI Utility

Software components

- VMware vCenter 5.5 build 1312298
- VMware Horizon View 5.2 build 987719
- VMware ESXi 5.5 build 1331820
- Microsoft SQL Server 2008 Enterprise Edition (64-bit)
- Windows Server 2008 R2 SP1

Other configuration notes
The number of desktops supported by the Hardware Accelerator is dependent upon the desktop resolution. See the following table for example configurations and maximum number of supported desktops.

<table>
<thead>
<tr>
<th>Maximum Width</th>
<th>Maximum Height</th>
<th>Maximum Number of Displays Offloaded</th>
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<tbody>
<tr>
<td>1280</td>
<td>1024</td>
<td>100</td>
</tr>
<tr>
<td>2560</td>
<td>1600</td>
<td>40</td>
</tr>
<tr>
<td>1920</td>
<td>1200</td>
<td>64</td>
</tr>
<tr>
<td>1680</td>
<td>1050</td>
<td>85</td>
</tr>
<tr>
<td>1280</td>
<td>1024</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 1  Number of displays supported based upon desktop resolution

The resolution settings can be changed using the following commands:

- `/opt/teradici/pcoip-ctrl -get-max-resolution`
- `/opt/teradici/pcoip-ctrl -set-max-resolution`