Flexible desktop deployment models using PCoIP technology

From auto manufacturers and oil companies to financial service firms and hospitals, organizations today are searching for new ways to provide employees with remote access to enterprise applications and data. Organizations need to offer graphics-intensive applications and deliver a superior end-user experience while ensuring tight security.

Solutions based on Teradici® PC-over-IP® (PCoIP) technology can address these challenges and give organizations the flexibility for selecting among multiple deployment models to meet their precise needs. This paper explores Dedicated Remote Workstation (DRW) deployment models using PCoIP technology. It suggests appropriate use cases, reviews network considerations, and highlights ways in which PCoIP technology can be implemented with Dell™ Flexible Computing Solutions.

Delivering rich, secure desktop environments with PCoIP technology

PCoIP technology is a display, encryption, and remote computing protocol developed by Teradici to securely deliver desktop environments to endpoints over a standard IP network. With the PCoIP protocol, the enterprise desktop environments (including the operating system and applications) run on rack workstations located in the data center, where they can be easily managed and secured. Individual users can access those environments from client systems via a local area network (LAN) or wide area network (WAN).

PCoIP solutions can deliver the performance users require for workstation-class, graphics-intensive applications. Users can work with high-resolution, full-frame-rate 3D OpenGL/Direct-X graphics and high-definition media. Because the PCoIP protocol dynamically adjusts image quality and frame rate based on available LAN or WAN bandwidth, users can maintain that high-end experience even as the network environment changes.

Deploying a PCoIP solution with a “zero” client device as the endpoint can help deliver that high-end experience while consuming very little physical space on the user’s desktop. A zero client is a compact device that includes a PCoIP processor and frame buffer memory but does not require local x86 processors, software drivers, applications, or an operating system. With a zero client, users can connect multiple monitors and input devices to achieve a native workstation-like experience. The Dell FX100 Zero Client device is equipped with a remote power button to control the workstation host.

PCoIP solutions help to enhance enterprise security by moving desktop computing to a secure data center. All computing is performed in the data center—no data ever leaves the data center. Rendering is performed on the host system and only encrypted pixels are transmitted to endpoints, so organizations can ensure the tightest security of data and communications.

At the same time, PCoIP solutions can help significantly reduce the time and resources required to manage enterprise client environments. With these solutions, administrators maintain desktop images in the data center. Consequently, they can accelerate provisioning of client systems, decrease the time and effort required for solving software problems, and simplify deployment of software patches and upgrades. And because these solutions enable IT groups to keep data in the data center, administrators can easily incorporate client data protection into enterprise strategies.
By using PCoIP technology in conjunction with a connection manager, such as VMware® View™ software, organizations can enable multiple, geographically dispersed employees to access the same workstation. For example, an employee in the United States could work on a project all day and then allow a team member in India to connect to the same or another session when the day begins there. The connection manager could also allow a single employee to access multiple workstations at different times. A software engineer, for example, could access multiple environments to help with product development.

Maximizing performance with a workstation—zero client deployment model

To deliver a rich experience and provide access to graphics-intensive applications over LAN and WAN, organizations can adopt DRW solutions that combine powerful workstations with zero client devices. For these solutions, each host is equipped with a PCoIP host card that is connected to the host’s graphics card or cards. The endpoint is a stateless zero client device with a PCoIP processor that is capable of supporting multiple monitors plus a keyboard and mouse.

Workstations and zero clients can be connected directly or through a connection manager such as VMware View Manager software. Using a connection manager increases the flexibility of the solution, enabling multiple users to access the same workstation at different times—for example, in different time zones.

This DRW model could be the right choice across a range of industries for use cases that demand high performance and the delivery of high-resolution OpenGL graphics to remote end users. Workers can securely access their work environment, run the latest workstation applications, and view high-resolution images without having to run a workstation at their desks.

This DRW model delivers a rich visual experience with multi-monitor support. Users also can capitalize on high-quality bidirectional audio to conference with remote colleagues or monitor digital media with excellent sound. In addition, PCoIP technology uses USB bridging technology to connect remote USB devices to the host system so employees can use a complete range of USB peripherals—from printers and scanners to Webcams and mass-storage devices—to get their work done.

PCoIP solutions use network bandwidth efficiently to provide high-quality graphics with minimal latency while helping to ensure tight security:

- **Flexible**—Compression algorithms dynamically adapt to changing network conditions to strike the best balance between image quality and responsiveness. Administrators have the flexibility to set bandwidth usage limits based on usage scenarios and individual user needs.
- **Efficient**—PCoIP downstream traffic is determined primarily by the user profile and screen resolution. Because only screen changes are transferred, maintaining the static display requires nearly no downstream network bandwidth.
- **Built to lossless**—In a network-constrained environment, the host delivers a compressed image to the client and then updates it with a progressively higher-quality image using PCoIP built-to-lossless technology until there is a complete, pixel-for-pixel image on the client screen.
- **Secure**—All PCoIP traffic is protected with IP Security (IPsec), hardware-accelerated 128-bit Advanced Encryption Standard (AES) encryption and authentication.
The Dell Flexible Computing Solution for this deployment model combines a Dell Precision™ R5400 workstation and Dell FX100 Zero Client desktop device. The Dell Precision rack workstation, which resides in the data center, is equipped with a Teradici PCoIP host card plus one or two multi-core Intel® Xeon® processors. Organizations can integrate an industry-standard PCI Express (PCIe)–based graphics card to deliver outstanding graphics performance for the remote user.

The FX100 is a compact device with zero x86 processors, operating systems, fans, or drivers, and nearly a zero footprint. The FX100 can communicate directly with the Dell Precision workstation host in the data center over the network or use optional VMware View Manager software as a connection manager.

Extending convenient access to remote and mobile workers

Some organizations need to give remote and mobile employees the ability to view designs or access information without the need for extensive interactivity. In these cases, IT groups could implement a PCoIP solution that combines the workstation with a software VMware View client. With this approach, engineers could use laptops to view computer-aided designs while traveling, oil and gas workers in the field could access key enterprise information, or multimedia specialists could review video content from a home PC.

The end-user experience will depend on the nature of the application, resources provided with the client system, bandwidth available, and network latency. This deployment scenario can support a maximum of two monitors with 1920x1200 resolution. It does not, however, currently support USB bridging technology. Currently, only input devices such as a keyboard and mouse are supported. Future versions of this deployment scenario could provide enhanced support for additional USB devices.

The Dell Flexible Computing Solution for this version of the DRW model includes a Dell Precision R5400 workstation coupled with a Dell OptiPlex™ FX160 desktop, or Dell Latitude™ 13 or Dell Latitude™ 2110 laptop pre-loaded with VMware View client software. VMware View Manager serves as the connection manager.

The FX160 thin client is a compact, energy-efficient system that can deliver the performance required for a range of computing tasks. Equipped with an Intel® Atom™ processor, the FX160 thin client comes pre-loaded with a Microsoft® Windows® XP Embedded or SUSE Linux® operating system environment. The Dell Latitude 13 and Latitude 2110 laptops feature thin designs with ultra-low-voltage Intel processors to deliver the performance and mobility required for this Flexible Computing Solution.

Streamlining desktop environments through alternative deployment models

PCoIP technology also can be deployed with a Virtual Remote Desktop (VRD) model that delivers effective desktop virtualization without using a PCoIP card–based host.

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<thead>
<tr>
<th>Industry</th>
<th>Use case</th>
<th>Applications</th>
</tr>
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<tbody>
<tr>
<td>Oil and gas</td>
<td>Oil field workers visualizing seismic information</td>
<td>- Halliburton GeoProbe</td>
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<td></td>
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<td>- Schlumberger GeoFrame</td>
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<tr>
<td>Engineering and manufacturing</td>
<td>Offshore workers accessing computer-aided designs, running simulations, or using mainstream design software</td>
<td>- SolidWorks 3D CAD</td>
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<td></td>
<td></td>
<td>- Autodesk AutoCAD</td>
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<tr>
<td></td>
<td></td>
<td>- ANSYS Workbench</td>
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<td>- Dassault Systèmes CATIA</td>
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<tr>
<td>Graphic design</td>
<td>Web designers using the latest graphics software and plug-ins while working remotely</td>
<td>- Adobe Creative Suite</td>
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<td>Digital entertainment</td>
<td>Remote artists using cutting-edge applications to create 3D animation</td>
<td>- NewTek LightWave</td>
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<td></td>
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<td>- Autodesk 3ds Max</td>
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<td>- Autodesk Softimage</td>
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<td>- Autodesk Maya</td>
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<tr>
<td>Aerospace and defense</td>
<td>Distributed product teams collaborating on new aircraft designs</td>
<td>- Dassault Systèmes CATIA</td>
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</table>

Table 1. The hardware-hardware PCoIP deployment model can support a wide range of high-performance use cases.
IT groups can run VMware View in a VMware vSphere™ environment on a data center server and then enable employees to use a range of endpoint systems, including compact Dell OptiPlex FX160 desktops and Dell Latitude laptops. IT groups also can choose to deploy stateless zero clients, such as the Dell FX100 Zero Client, to bring the advantages of zero clients to the VRD approach. This VRD model is best suited for business offices, medical offices, and connected classrooms rather than high-performance design or engineering environments. Typical workloads might include office productivity applications, Internet browsing, 2D design applications, and video and Flash-based multimedia applications.

**Taking the next steps toward PCoIP technology**

Solutions based on Teradici PCoIP technology can deliver a rich user experience while maintaining tight security and streamlining IT management. The Dell Flexible Computing Solutions team can help organizations design, implement, and support a solution based on PCoIP deployment models or a solution that adopts another approach to desktop virtualization. With Dell Flexible Computing Solutions, organizations can capitalize on the latest advances in network bandwidth, virtualization technologies, and network-based computing to meet the needs of IT and end users.

**For more information**

Dell, Teradici, and VMware offer a wealth of documentation—from white papers to deployment guides—to help organizations start down the path toward flexible desktop computing with PCoIP technology. To learn more about PCoIP technology and its implementation in Dell Flexible Computing Solutions, visit:

- Dell Flexible Computing Solutions—dell.com/fcs
- Dell Remote Desktop Workstation—dell.com/drw
- Teradici—pcoip.com
- VMware View—vmware.com/products/view

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**Dedicated Remote Workstation (DRW) deployment models with PCoIP technology**

<table>
<thead>
<tr>
<th>Deployment model</th>
<th>Sample workloads</th>
<th>End-user experience</th>
<th>Dell Flexible Computing Solution</th>
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<tbody>
<tr>
<td>Workstation with a zero client device</td>
<td>• Seismic visualizations&lt;br&gt;• Computer-aided design&lt;br&gt;• Financial modeling&lt;br&gt;• Graphic design&lt;br&gt;• 3D animation</td>
<td>• Multi-monitor support&lt;br&gt;• USB support for multiple devices, from scanners and printers to mass-storage devices&lt;br&gt;• Full-frame-rate 3D OpenGL/Direct-X graphics performance for local workstation-like design use</td>
<td>• Dell Precision R5400&lt;br&gt;• Dell FX100 Zero Client&lt;br&gt;• VMware View Manager connection manager</td>
</tr>
<tr>
<td>Workstation with a traditional client system</td>
<td>• Up to 2 monitors at 1920x1200&lt;br&gt;• USB keyboard and mouse</td>
<td></td>
<td>• Workstation: Dell Precision R5400&lt;br&gt;• Client Devices: Dell OptiPlex FX160, Dell Latitude 13, or Dell Latitude 2110&lt;br&gt;• VMware View Manager connection manager</td>
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