



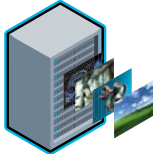
## PCoIP<sup>®</sup> technology

**the PCoIP protocol compresses, encrypts and encodes the entire computing experience at the data center and transmits it 'pixels only' to stateless PCoIP zero clients, delivering an uncompromised user experience**



# PCoIP® technology explained

PCoIP technology is the result of a breakthrough in display compression for connecting desktops over IP networks. PCoIP technology allows all enterprise desktops to be centrally located and managed in the data center, while providing the remote user – whether task worker or power user – with an exceptional user experience. The PCoIP protocol compresses, encrypts and encodes the entire computing experience at the data center and transmits it ‘pixels only’ to stateless PCoIP zero clients. Data never needs to leave the data center. The PCoIP protocol is implemented in silicon for hardware accelerated performance, and in software in VMware View™. There are three unique features of PCoIP technology:



## Host rendering

In a regular PC, the applications, operating system and graphics drivers are tightly coupled to the display, and the whole assembly is optimized for performance. PCoIP technology uses host rendering, which preserves the PC environment intact: system performance is maintained, hardware interfaces remain unaffected, applications perform as they should, no driver changes are required, and the client can be a low-cost, stateless, ‘true zero’ client. There are no application dependencies or incompatibilities between the host and the client; application enhancements and future applications are not dependent on the client’s processing capabilities.

Host rendering also decreases latency sensitivity. The PCoIP protocol re-sends lost packets only if that section of the image has not changed since the packet was lost – which reduces the amount of unnecessary re-transmissions and enables a rich user experience even on high-latency networks.



## Intelligent image decomposition using multiple codecs

PCoIP is uniquely a multi-codec protocol. Because not all image elements on a display are of the same type, using the same codec for every element would use excessive bandwidth. Instead, the PCoIP protocol continuously analyzes and decomposes the image elements – graphics, text, icons, video, etc. – and compresses them with the right codec for each pixel. This enables efficient transmission and decoding, saves bandwidth, and enables image elements that rapidly change to be displayed. PCoIP codecs build every pixel to a lossless state once they stop changing. This is critical particularly where the image itself contains

important information, such as in medical diagnostics, geospatial analysis, and media production. Optionally, build to lossless can be disabled in favor of build to perceptual lossless in order to maximize bandwidth savings.

## Dynamic network adaptation

The PCoIP protocol is an ‘intelligent’ protocol, dynamically adapting to network conditions in real time. Image quality settings can be easily configured to manage bandwidth use. PCoIP adaptive encoders then adjust image quality according to congestion on the network, within the set limits. Once network congestion decreases, maximum image quality is resumed.

Because PCoIP technology transmits just pixels, not data, it can use UDP, a real-time, highly efficient protocol used in VoIP and IPTV, which is ideally suited to the practicalities of working remotely over a limited bandwidth network. It increases responsiveness even in simple tasks like, for example, zooming in and out, where many pixels are changing and the image doesn’t require pixel-perfect accuracy until it stops changing.

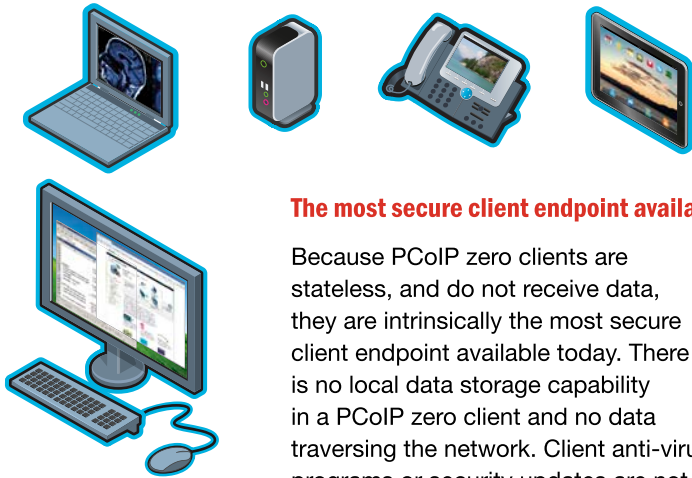


**A remote user requires local PC-like display performance with responsive interaction, and a pixel-perfect image. PCoIP technology’s combination of host rendering, intelligent image decomposition using multiple codecs, and dynamic network adaptation delivers this experience.**

# Stateless. Simple. Secure.

## PCoIP® zero clients

The ability of the PCoIP protocol to deliver host-rendered, encrypted pixels means that a client's only functions are to receive and decode the pixels and accept user commands from a keyboard and mouse. To do this, clients have no need for applications or an application operating system, which means they do not require a general purpose CPU, RAM, GPU, local disk drive or cooling fan. They can be true zero clients. The net result of this simplicity includes greater security, unique form factors, lower cost, easier manageability, higher reliability, and longer lifespan. PCoIP zero clients and other PCoIP devices are readily available from a wide variety of manufacturers and suppliers, and many devices are VMware Ready™ certified.



PCoIP technology enables a proliferation of zero client devices

### The most secure client endpoint available

Because PCoIP zero clients are stateless, and do not receive data, they are intrinsically the most secure client endpoint available today. There is no local data storage capability in a PCoIP zero client and no data traversing the network. Client anti-virus programs or security updates are not required. Extensive USB security and authentication features are provided to remove the threat of unauthorized USB devices or download. Zero clients also support multiple-factor authentication for use with proximity cards and smart cards.

### Unique form factors

PCoIP zero clients are powered by a single, highly integrated, purpose-built TERA-series processor designed by Teradici. The processor is powerful enough to support a rich multi-media experience for all users, and is designed to maintain this experience as applications become more graphically intense, which further extends the life of the PCoIP zero client. The TERA processor enables a wide variety of endpoint devices. PCoIP integrated displays, VoIP phones, and touch-screen monitors – some with Power over Ethernet – all use space more efficiently, do not use much power and generate little waste heat. Standalone PCoIP hardware zero clients are the size of a book, and support multiple wide screen formats (currently up to 4 displays, 1920x1200 resolution, 32-bit color), HD audio, and local USB peripherals.

### Lowest cost for the highest performance

PCoIP hardware zero clients provide the lowest cost for the highest performance client device available, significantly reducing desktop provisioning costs. Power consumption, cooling, space, and noise are greatly reduced, while management and maintenance costs are radically less than traditional desktop PCs and thin client devices. With no need to constantly upgrade, PCoIP hardware zero clients are assured of an extended life span. When end of life is reached, the reduced mass of the zero client hardware reduces recycling costs and environmental despoilment. To offset the cost of implementing zero clients, large organizations can, depending on configuration, re-purpose existing PCs using a PCoIP software client implementation to enable the transition to take place over a longer time period.

### Session portability and multi-function support

A user can interact with their desktop from different types of zero clients. As a user moves between devices the same session remains available. Different users can log on to various zero clients to continue their own session running on the host. From the same zero client, office workers and power users can securely access different applications. Multi-function environments include connection to both highly virtualized desktops as well as high-performance PCs and workstations. Host infrastructure managed under VMware View™ can include View software side-by-side with PCoIP hardware encodes. PCoIP clients support all enterprise users simply according to log-in credentials, from office task workers to designers who need robust 3D graphics.

# Hardware acceleration for VDI servers

## APEX 2800 PCoIP® server offload card

The concern in any VDI implementation is usually the processing power of the server's CPU and how many virtualized desktops it can support. The APEX 2800 PCoIP server offload card insures the success of VDI deployments in a VMware View environment by reducing server CPU utilization to deliver a consistently high level of user experience as loads change, enable increased VM consolidation ratios, and use data center resources more efficiently.

### Consistently high level of user experience

The APEX 2800 PCoIP server offload card insures against adverse effects from unexpected image processing loads on the CPU, protecting and ensuring a consistently high level of user experience. By constantly monitoring the graphic encoding demands of each virtual machine, the server offload card determines – in real time – the 64 most active displays that will benefit the most from hardware acceleration. The server offload card dynamically and seamlessly switches image compression tasks from the software image encoding in the CPU to hardware image encoding and back again – instantly, as needed – without the user noticing the switch.

performance is also assured – more available CPU power enables virtual machines to run more intensive applications, and future applications can be more easily accommodated.

Each server offload card supports up to 64 simultaneous 1920x1200 displays, or 32 dual displays, and additional cards can be added, depending on the number of free slots, to support even more displays. If the server does not support 64 displays, then PCoIP image encoding is continuously offloaded, freeing the CPU for other tasks.

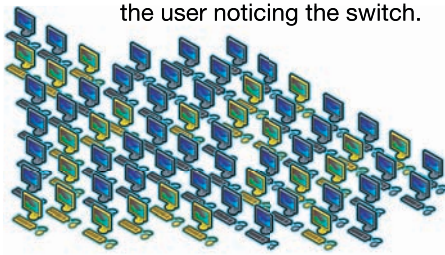
### More efficient use of data center resources

Each APEX 2800 PCoIP server offload card consumes less than 25 watts, and requires a single x8 PCIe card slot in the server. Because the server offload card enables up to 1.4x more virtual machines to be added to each server, it provides significant cost savings compared to adding another server CPU, and results in fewer servers. Increased consolidation ratios result in decreased management costs per user, while reduced data center power consumption and data center floor space results in greater data center efficiency and decreases overall IT cost per user.

Complex configuration is not necessary. The PCIe full-height, half-length card simply plugs into the server, and is enabled in VMware View by selecting “enable hardware acceleration”.

The server offload card is compatible with all existing PCoIP zero clients and VMware View software clients, is integrated with VMware vSphere™ and managed by VMware View.

the APEX 2800 dynamically offloads the 64 most active displays



The dedicated, custom processor on the server offload card is 10 times faster than a typical server CPU in performing image encoding, delivering reliable and consistent performance as VDI workloads shift. The server offload card is matched to PCoIP zero clients to provide the best possible user experience.

### Increased VDI consolidation ratios

The APEX 2800 PCoIP server offload card increases VDI consolidation ratios by up to 1.4x and frees the server CPU for other tasks. By offloading PCoIP protocol image compression tasks to the server offload card, server CPU utilization is decreased by up to 30%, allowing more users to be assigned to single vCPU virtual machines. The additional headroom accommodates image processing spikes. Application

the APEX 2800 server offload card enables up to 1.4x more VMs to be added to each server

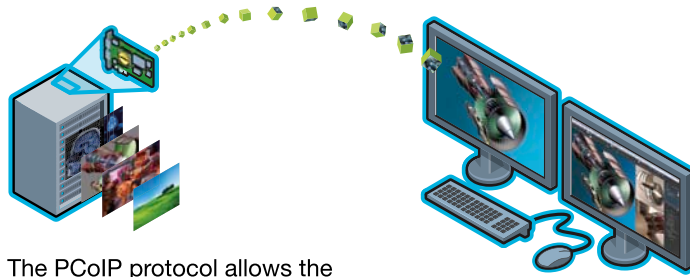


# The ultimate remote workstation experience

## PCoIP® technology for high performance workstations

CAD design, medical diagnostics, movie post-production, animation, geospatial analysis, trading stocks... all require a powerful computing capability and are usually graphically intensive. Both of these requirements are particularly challenging for VDI. Teradici's PCoIP workstation solution benefits from the intrinsic attributes of PCoIP technology and has become the solution of choice for power users looking for maximum remote performance.

Teradici's TERA processor series is designed for workstation performance. It supports high resolution, full frame rate 3D graphics and HD media, full USB peripheral connectivity, and supports multiple 1920x1200 displays. The TERA processor has been built into a wide variety of PCoIP technology solutions from leading manufacturers and includes rack-mount workstations, blades, host cards and zero clients, many of which are VMware® Ready certified.



PCoIP workstation solution of choice for maximum remote performance

The PCoIP protocol allows the workstation to be centrally located and managed in the data center, ensuring the security of the data. Because the PCoIP protocol transmits only pixels, large files are not transmitted across the network. At the desk, users benefit from the use of PCoIP zero clients – there's less noise and heat in the work area and space is not consumed by large workstations.

These attributes enable a secure remote or home office to be quickly provisioned simply by supplying a high definition zero client display. Users can work remotely, even across a WAN to another city, and sub-contracting becomes possible without fear of data theft.

manage up to 2,000 PCoIP devices remotely from a browser



## PCoIP® Management Console

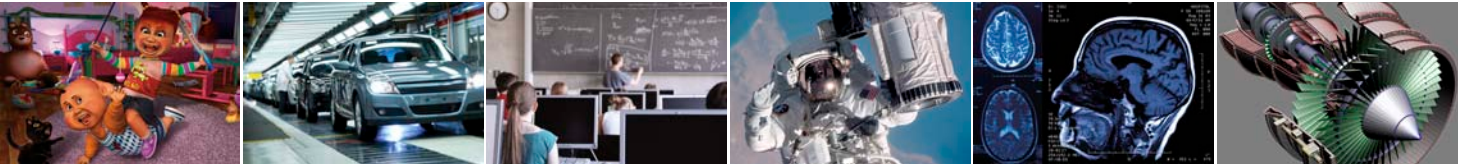
The Teradici PCoIP Management Console is a web-based management tool that allows administrators to manage an entire enterprise deployment of PCoIP devices from a single display with a web browser, further streamlining the already minimal management of PCoIP infrastructure.

The Management Console automatically discovers PCoIP devices and enables new PCoIP zero clients to be added, grouped and configured to a network automatically. It enables remote configuration, management and monitoring of host and client device parameters, control of power and reset, and provides remote update of the firmware for all the PCoIP devices in an organization – all through a single web interface.

PCoIP hardware zero clients are both easy to install and maintain. There is no application operating system to upgrade, or antivirus or codec updates, or hard drive to fail. This simplicity, together with the PCoIP Management Console, frees IT staff from the need to visit client locations, and effectively allows IT staff to manage all IT resources from a single, central location.

The Management Console is packaged as a VMware virtual machine and runs on VMware Player™, and is available for download at no charge from the Teradici support site.





# live VDI

Only PCoIP technology makes VDI live.  
Find a live PCoIP event in your area:

+1.604.628.1200

[www.pcoip.com/live](http://www.pcoip.com/live)

Teradici drives innovation to fundamentally change the way people use and deploy computers by developing technology and solutions that deliver a true, uncompromised PC user experience over IP networks. Our focused approach in designing advanced image processing algorithms enables the physical separation of the computer and the user, and ultimately will change the way enterprises compute.

TRUE EXPERIENCE. NETWORK DELIVERED.

The Teradici logo, consisting of a green curved line above the word "TERADICI" in a bold, black, sans-serif font.