System-on-a-Chip power for Citrix clients

HP t410 Smart Zero Clients provide an optimized system-on-a-chip (SoC) solution for Citrix® HDX™ Ready end points

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End users working in a desktop virtualization environment expect nothing short of a PC-like experience. That’s the idea behind HP t410 Smart Zero Clients optimized as Citrix® HDX™ Ready end points. With a system-on-a-chip (SoC) architecture, these small-footprint devices provide powerful client virtualization in a streamlined solution that combines Thin Client security and management with impressive PC-like performance.

Executive summary

HP t410 Smart Zero Clients are part of a broad portfolio of HP Thin Clients optimized to deliver a rich end-user experience along with the IT and security advantages of virtual desktop infrastructure. For Citrix desktop virtualization environments, the HP t410 devices offer unique advantages, including a rich multimedia experience, excellent power efficiency, easy manageability, and a compact footprint.

These benefits are fueled by a system-on-a-chip (SoC) architecture that works in tandem with unique HP technologies, engineering innovations, and technical optimizations to deliver a PC-like experience across the virtual desktop environment.

The advantages of a system-on-a-chip (SoC) architecture

The HP t410 and t410 AiO devices are based on a system-on-a-chip (SoC) architecture. This architecture takes the majority of the components that would typically be on a system motherboard and puts them on a single chip. The SoC technology in today’s Thin Clients is an offshoot of cell phone technology.

Thin Clients based on SoC technology offer distinct advantages over Thin Clients with componentized architectures. The latter are essentially collections of chips—one for the processor, one for the graphics subsystem, one for the network interface, and one for the memory controller.

The Texas Instruments SoC that HP chose for the t410 and t410 AiO devices has an additional benefit beyond most SoC designs. The Texas Instruments SoC has a purpose-built compute engine (a digital signal processor, or DSP) that is optimized for heavy algorithmic number crunching. HP chose the Texas Instruments SoC for the HP t410 devices because it provides the ability to have flexible hardware acceleration via the DSP to enhance the remote computing experience.

Why HP t410 and t410 All-in-One (AiO) are ideal for Citrix® HDX™

HP took the attributes of its flexible hardware design approach and worked with Citrix and Texas Instruments to enable the Citrix Receiver™ to use the DSP for large JPEG decode, thus enabling the HP t410 to be the ideal personification of the Citrix SoC concept. The Citrix SoC’s ability to use the DSP for compute-intensive tasks reduces the load on the CPU in the SoC to help deliver an outstanding end-user experience.

This architecture capitalizes on an overarching benefit of SoC technology—the simplification that comes with having all key components embedded in a single piece of silicon. In addition, the SoC package tends to be easier to cool and more power efficient than componentized packages, while offering lower system latency.¹

Citrix HDX Ready SoC

Citrix HDX technology is designed to deliver a high definition user experience for any desktop, application, device or network. The technology includes network and performance optimizations that make desktop virtualization both scalable and practical, even over low bandwidth and high latency WAN connections. HDX encompasses all the factors that can impact an end-user’s Citrix XenApp™ or XenDesktop™ experience.

The Citrix HDX Ready SoC technology initiative provides a standards-based chipset optimized to deliver a rich HDX user experience. The initiative, launched in 2011, enables a broad ecosystem of vendors to create new high-performance HDX clients and new form factors at a new price-performance level. Innovative products delivered in conjunction with the Citrix HDX Ready SoC technology initiative include the HP t410 and t410 AiO Smart Zero Client.
**HP t410 and t410 AiO Smart Zero Clients: Zero vs. Smart Zero**

Plug these appliance-like Citrix® HDX™-Ready client devices into a XenDesktop™-enabled network and provide your end users with a full HDX experience. Or you can deliver a full Windows experience using Microsoft RDP and Microsoft RemoteFX. These versatile devices can also implement all existing PCoIP protocol capabilities to give your users a PC-like experience.

**The advantages of a zero client**

So what is a zero client? A zero client is essentially a thinned-down version of a Thin Client. A Thin Client works in conjunction with a backend server to offload much of the work that would typically be done locally on a desktop system. Thin Clients often run a pared-down version of a Windows or Linux operating system that resides on the client device.

In contrast, zero clients have no operating system, which makes them even easier to manage. They require no software drivers, no antivirus software, and no OS patches or other application software updates. They simply provide an interface for a mouse, a screen, and a keyboard. The most that zero clients might need in terms of management is centralized software to update the firmware built into the hardware processor. Everything else is handled on the backend server.

**The advantages of a smart zero client**

A smart zero client makes life even easier for your IT team. There are just three steps from log on to productivity. With HP Smart Zero Technology, at each boot up the HP t410 automatically identifies the assigned environment from the server—even if the client virtualization software has been transitioned to a new environment. Your users receive seamless updates as needed—and you don’t have to touch any of it.

The HP Smart Service was shaped by inputs from HP customers, as was the development of HP Zero Clients. When we began our investigation into zero clients, we asked our customers what they liked about zero clients and what they did not like about zero clients.

Customers liked that zero clients start quickly and take the user right to a logon screen. They also liked the simplicity of a plug-and-play device that does not need a complicated management infrastructure. Customers did not like the thought of a zero client that would lock them into a particular backend infrastructure. They also worried they would have no scalable way to update the devices.

In response to that customer feedback, we created the HP Smart Service. This service enables you to take the zero client out of the box, plug it in, and make the user functional without IT intervention. Simple dialogue boxes on the Smart Service remove the threat of backend vendor lock-in, which is the reason for multivendor support.

**Added value with PoE technology**

The HP t410 AiO adds the value of Type 1 Power over Ethernet (PoE) technology. With this technology, the PoE power level allows the power-consuming device to be guaranteed 13W from the power sourcing equipment—the lowest power level of the PoE specification. That amount of power is on par with the power used by a night-light.

![Figure 1. A cooler Thin Client](image-url)
Putting the HP t410 to the test: Benchmark results

The following table shows the advantages of an SoC end-client that includes a DSP. In the table the DSP architecture solution (HP t410) includes the Texas Instruments DM 8148 chip. Comparatively, the previous generation arm-solution doesn't include a DSP but is a popular solution with other companies.

<table>
<thead>
<tr>
<th>Use case</th>
<th>DSP architecture</th>
<th>Non-DSP architecture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avi playback (480p MPEG-4 v2)</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Mp4 playback (720p AVC)</td>
<td>23</td>
<td>16</td>
</tr>
<tr>
<td>WMV playback (720p WMV-3)</td>
<td>23</td>
<td>14</td>
</tr>
<tr>
<td>WMV playback (1080p WMV-3)</td>
<td>23</td>
<td>20</td>
</tr>
<tr>
<td>Mp4 playback (1080p AVC)</td>
<td>23</td>
<td>4</td>
</tr>
<tr>
<td>Mov playback (1080p H.264)</td>
<td>24</td>
<td>4</td>
</tr>
</tbody>
</table>

Note: the numbers represent frames per second

Both devices were tested in the same Citrix® XenDesktop™ lab environment, playing back video files using Windows Media Player and HDX Media Stream to redirect the video rendering to the client. High-resolution test video clips were chosen to stress the client-side decode capabilities.

As the table shows, the SoC that has a DSP as well as an ARM® CPU delivers better performance in demanding end-user environments. Drawing on these technologies, the HP t410 delivers high performance in a small form-factor and power envelope.

Looking ahead: A technology with a future

While no technology is future proof, there is a strong case to be made for a bright future for the Citrix HDX™ Ready SoC solution. A growing number of vendors are building hardware or DSP components around the SoC architecture, and Citrix is actively working to optimize HDX features for the ARM-based SOC platform.

To this point, a Citrix blogger noted: “We are working on each HDX feature one by one to optimize it on ARM SoC platform. Though this is an incremental process, the customers don’t have to worry about it because the devices that they will buy today will just need a software upgrade in the form of firmware and Citrix Receiver™ upgrade to support the future optimizations.”

A portfolio of client devices optimized for Citrix

For organizations interested in desktop virtualization in a Citrix environment, HP offers a range of client devices optimized for Citrix HDX technology. These include appliance-like HP Smart Zero Client devices that make desktop virtualization as simple as setting up your server, booting the client and connecting to the network, and HP Flexible Thin Clients designed for security, growth and expansion.

The HP portfolio includes:

- **HP t410 AiO Smart Zero Client**—HP’s lowest-power, system-on-a-chip, all-in-one smart zero client that operates within a 13-watt power envelope and works in three protocols—powered by one Ethernet wire
- **HP t410 Smart Zero Client**—An intuitive, system-on-a-chip, client built for virtualization environments that demand PC-like performance, flexible protocol support, and zero management
- **HP t510 Flexible Thin Client**—A feature-rich Thin Client with significant performance, a smart design, and easy setup to support and protect your virtualized environments
- **HP t610 Flexible Thin Client**—Our most powerful and flexible Thin Client series—with more security, more expansion options, and a PC-like multimedia experience.
Common Management Environment

While they have notable differences, these Thin Clients share many HP-unique features, including HP Device Manager and HP Smart Client Services. HP Device Manager is a key component of HP’s overall management strategy which allows you to track, configure, upgrade, clone, and manage up to thousands of Thin Client devices with ease. HP Smart Client Services is a set of utilities that help with the configuration and deployment of the Thin Clients. HP Smart Client Services enable you to set up the configuration one time and have the configuration applied to many clients on the network with a single click.

With this common management environment, you don’t have to choose just one type of Thin Client. Instead, you can deploy different clients to meet the needs of different users, and manage the devices collectively with HP Smart Client Services. For example, HP gives you the ability to run Smart Zero operating environments across multiple hardware platforms (HP t410, HP t510, and HP t610 clients). This eliminates the need for complicated management tools and configuration work at the end point.

HP Velocity

HP Thin Clients share support for HP Velocity, a software engine that boosts network performance. HP Velocity provides Thin Client users a rich virtualization experience even in the most challenging network environments. It dynamically adjusts with changing network conditions to maintain the best user experience when working on unmanaged networks, such as WAN and Wi-Fi environments.

HP Velocity is especially suited for teleworkers, branch and remote offices, Wi-Fi, and high-latency environments. It monitors the data flow, type of traffic, type of network, and amount of data loss, and then implements various optimizers to improve the user experience. It also collects detailed metrics to give you visibility, and it continually adapts as your conditions change over time.

HP reference architecture (RA)

HP reference architectures (RA) integrated with Citrix XenDesktop™ (enterprise solutions with either Microsoft Hyper-V or VMware® vSphere); or VDI-in-a-Box (mid-sized solution that includes the capabilities of Citrix Personal vDisk) can save you time and effort with Login VSI-validated configurations, sample bills of material, and best practices for architecting compute, storage and networking specifically for client virtualization.

Unique in the industry, HP CV n8 RA for XenDesktop on vSphere integrates Citrix XenDesktop with HP client virtualization and VMware vSphere technologies. The solution supports the server-hosted virtual desktop infrastructure (VDI) model, as well as:

- Hosted-shared desktops
- Client-hosted desktop virtualization (DV)
- Virtualized applications
Key takeaways

For Citrix desktop virtualization environments, the HP t410 and HP t410 AiO Smart Zero Clients offer unique advantages to both end users and IT personnel.

- For end users, the devices offer a rich multimedia experience, PC-like performance, and a compact footprint that saves scarce space in today’s work areas.
- For IT administrators, these Smart Zero Clients offer quick deployment, easy manageability, and excellent power efficiency, along with the security advantages of virtual desktop infrastructure.

These benefits are driven in part by an SoC architecture that works in tandem with unique HP technologies, engineering innovations, and technical optimizations to deliver a PC-like experience across the virtual desktop environment.

1 Lower system latency is achieved by reduced distances travel by comparing the distance electricity must travel within a single chip versus chip to chip over a motherboard.

2 “Update on HDX Ready SoC,” by Vipin Borkar, February 13, 2013