

Enhancing Dental Imaging Efficiency with SOTA Cloud and Thin Client Virtualization

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Abstract

This whitepaper explores how SOTA Cloud can help leverage thin client virtualization. It addresses the challenges faced by dental service organizations seeking to streamline and economize the management of dental IT infrastructure, with a particular emphasis on dental imaging solutions. The paper explores the performance of dental imaging hardware in various virtualized environments using SOTA Cloud, provides practical recommendations for integrating SOTA Cloud into a VDI environment, and identifies avenues for future improvements.

Introduction

The dental imaging field has traditionally relied on costly standalone equipment and localized software, resulting in high operational expenses and limited scalability. SOTA Cloud offers a solution that seamlessly aligns with thin client virtualization, providing cost-effective and efficient imaging solutions for dental organizations at scale.

What are Thin Clients?

Thin Clients

A thin client is a lightweight computing device that centralizes processing and data storage, boasting minimal local processing power and memory. These devices rely on network connectivity to access applications and resources from a central server, offering cost-effective, secure, and centrally manageable solutions.

Considerations for Selecting Thin Client Hardware

Thin clients come in a variety of forms, with varying levels of on board processing power. For use with intraoral sensors, panoramic machines, and cephalometric machines, the key consideration is robust support for USB redirection. Thin client product lines from popular brands such as Dell and HP are generally all sufficient for these purposes. For intraoral camera use, it is important to select a thin client with sufficient processing power to compress and transmit live video efficiently to the VDI server. SOTA Cloud can assist IT teams with vetting thin client hardware based on an enterprise's specific needs. In most cases, it is also possible to use the PCs already in an office as a thin client, reducing the need for new hardware to make the switch to a VDI environment.

SOTA Cloud Compatibility with VDI Infrastructure

SOTA Cloud has undergone testing with popular VDI systems, protocols, and thin client hardware and operating systems, and is broadly compatible with most brands of intraoral sensors, panoramic machines and intraoral cameras. Specific information on configuration and compatibility with different modalities, brands, and device models can be furnished upon request and is dependent on the underlying hardware and protocol used. SOTA Cloud is committed to collaborating with enterprise customers to ensure compatibility validation in their unique environments.

Important Considerations for VDI Environments

Given the network-dependent nature of VDI environments, careful planning of network infrastructure is crucial, factoring in bandwidth requirements for workstations and all connected devices in an office network. Bandwidth considerations should account for display resolution and USB device requirements at the workstation level, as well as the cumulative network bandwidth used by thin clients and other network resources (e.g., VoIP phone systems, media streaming, guest Wi-Fi). In cases of off-site VDI hosting, verifying the availability of sufficient bandwidth for connections from all locations is essential. This is more important in environments making heavy use of intraoral cameras, of which performance is heavily impacted by network bandwidth.

Dental Hardware Testing

SOTA Cloud Test Environment Description

Compatibility testing with SOTA Cloud encompassed a range of modalities, brands, and device models.

Operating System Compatibility

Thin client operating systems that have been tested and verified to be compatible with SOTA Cloud include:

- Dell ThinOS
- HP ThinPro OS
- Teradici
- Windows

This list is non-exhaustive and other thin client operating systems are likely to also work well with SOTA Cloud.

Hardware Compatibility

Most modern thin client hardware will work with SOTA Cloud, but our test environment verified compatibility with the following devices:

- HP t640 thin client
- Dell Wyse 3040 thin client
- Dell OptiPlex 5050 Micro

Protocol Compatibility

In all cases, a virtual machine with 2 vCores and 4 GB of RAM was used. We tested a variety of virtualization servers (VMWare Horizon/ESXi, Microsoft Hyper-V, Citrix) using a standard 1Gbps LAN. The following connection protocols were tested:

- RDP
- VMWare BLAST
- PCoIP

Dental Hardware Tested

Testing included all major intraoral sensor brands, as well as a representative selection of intraoral cameras with varying resolution specifications, capture button implementations, and costs. Panoramic machine performance was evaluated using TWAIN simulation software, the industry-standard interface for receiving images from panoramic and cephalometric machines.

Test Results

Intraoral Sensors

SOTA Cloud proved highly compatible with intraoral sensors across various environments and configurations, with only minimal driver configurations in some cases. In general, intraoral sensors presented no major barriers to compatibility or performance in VDI environments. Specific environments may necessitate minor configurations, mainly related to USB passthrough policies, but these are generally straightforward.

Panoramic and Cephalometric Machines

Simulated panoramic and cephalometric machines exhibited typical performance with no issues in any environment, leveraging standard TWAIN interfaces effectively.

Intraoral Cameras

Intraoral cameras, despite their increased bandwidth requirements, functioned effectively in virtualized environments. Configuration complexities occasionally arose due to device-specific requirements, especially concerning capture button controls. High-definition (HD) cameras may demand additional network resources, with potential network limitations when hosting virtualization servers off-site. In such scenarios, collaborating with the device manufacturer to optimize resolution settings and reduce bandwidth demands is advisable. Overall, RDP stood out as the most practical protocol in terms of compatibility and performance due to the numerous available options for USB device redirection. VMWare BLAST, while performative, was inconsistent in device support, as was PCoIP. For this reason, SOTA Cloud recommends RDP in environments that make significant use of intraoral cameras or have a variety of intraoral camera models in use.

Conclusion

SOTA Cloud, in conjunction with thin client virtualization, offers dental enterprises an opportunity to streamline operations, reduce costs, and enhance scalability. This approach integrates smoothly with dental hardware, providing efficient imaging solutions. The performance and compatibility of X-ray sensors, panoramic machines, and intraoral cameras in virtualized environments demonstrate the potential benefits of this approach. As dental practices adapt to the demands of modern healthcare, SOTA Cloud emerges as a solution that can improve imaging processes for both providers and patients.