



## Virtual Desktop Infrastructure (VDI) and Desktop Videoconferencing

### The Opportunity & Challenge

#### Introduction

Many organizations are moving away from traditional PC-based desktop architectures in favor of the Virtual Desktop Infrastructure (VDI) and/or Virtual Application Infrastructure (VAI). VDI and VAI enable knowledge workers to access software applications and desktops located in data centers from low-power terminals anywhere.

The benefits of the virtual infrastructure are well understood:

- Virtual desktop and application infrastructure allows enterprises to centralize the management and delivery of applications and desktops, significantly reducing the cost of desktop management.
- Virtual desktops support mobility by making it easy for users to work productively from anywhere with the best application performance and security regardless of location.
- Virtual desktops enable business continuity.
- Thin client infrastructure provides “green IT” that is aimed at lowering power consumption, lowering heat generation which reduces the need for cooling, and saving energy (e.g. through the absence of servers in the building).

Citrix is the market leader in the VAI and VDI space: Citrix XenApp provides virtual application delivery, whereas Citrix XenDesktop provides virtual desktop infrastructure. Customers typically deliver virtual applications to traditional PC platforms, whereas a typical VDI deployment delivers desktops to “thin” terminals manufactured by companies like Wyse and HP.

#### The Opportunity and Challenge:

Customers that would like to use XenApp and XenDesktop to deliver their entire set of desktop applications, including unified communications tools such as Avistar, Microsoft OCS/Lync, and IBM Sametime. Deploying real-time interactive voice and video communications applications with VDI and VAI, however, poses a unique set of challenges:

- Server-based audio/video compression requires significant network bandwidth to allow uncompressed audio/video to be sent over the network. For example, a CIF stream running at 30fps uses approximately 50Mb/s. This makes video over VDI impossible across WANs and impractical at best in local area deployments.
- Protocols used by VDI are typically based on TCP. However, delivering real-time audio and video over TCP is not practical because of packet loss, which will result in retransmissions and delay spikes.
- Server-based audio/video compression and decompression limits the scalability of VDI and VAI deployments, as compression and decompression requires a significant amount of CPU cycles.

To address these challenges, Avistar C3 Integrator™—Citrix Edition enables the voice and video communications “desktop videoconferencing” experience on Citrix XenApp/XenDesktop.

## **Solution Approach & Overview**

The Avistar C3 Integrator™—Citrix Edition is based on the Avistar C3 Media Engine™ solution, optimized for Citrix environments. We first describe the capabilities of the Avistar C3 Media Engine™ solution. Then, we will discuss the Avistar C3 Integrator™—Citrix Edition. Finally, we discuss how Avistar C3 Integrator™—Citrix Edition can be used to enable the full functionality of Microsoft Office Communicator on Citrix.

### **Avistar C3 Media Engine™**

The Avistar C3 Media Engine™ solution delivers the core media processing experience for all Avistar desktop endpoints and has been the foundation of the Avistar C3™ system since 2004. The combination of deployment at scale, field-tested ruggedness, and a standards-based software design and deployment makes the Avistar C3 Media Engine™ solution the perfect foundation for Citrix’ customers global rollout requirements.

The Avistar C3 Media Engine™ solution can be deployed as a general-purpose SIP voice and video engine to be integrated with a variety of other technologies. It has the following characteristics:

- The Avistar C3 Media Engine™ solution is designed with embedding and integration in mind: all functionality is delivered entirely through APIs. GUI to these features can be provided on top of these APIs directly by the embedding application, or existing GUIs can be customized to fit the look-and-feel of the embedding application.
- The Avistar C3 Media Engine™ solution supports G.711, G.722, G.722.1c, and AAC-LC for audio calls from 3 kHz to 14 kHz (ultra-wideband). Avistar C3 Media Engine can be used for audio-only calls as well as audio/video calls.
- The Avistar C3 Media Engine™ solution supports H.264, H.263+, and H.263 for video. Video call rates range from 128kb/s to 2048kb/s. All video will be encoded at up to 30fps (depending on the webcam used) and transmitted over RTP.
- The Avistar C3 Media Engine™ solution includes HD support. Supported video resolutions:
  - HD 720P (1280 X 720 pixels)
  - 4CIF resolution (704 X 576 pixels)
  - VGA resolution (640 X 480 pixels)

- CIF resolution (352 X 288 pixels) or SIF (352 X 240)
- QCIF resolution (176 X 144 pixels) or QSIF (176 X 120)

In addition, 16 X 9 aspect ratios are supported for a more modern look-and-feel.

- The Avistar C3 Media Engine™ solution optimizes Quality-of-Experience (QoE) through adaptive jitter buffer, packet loss concealment, call rate adaptation, and other techniques.
- The Avistar C3 Media Engine™ solution supports standards-based firewall traversal (using STUN, TURN, and ICE)

The Avistar C3 Media Engine™ solution software as shown in the following figure:

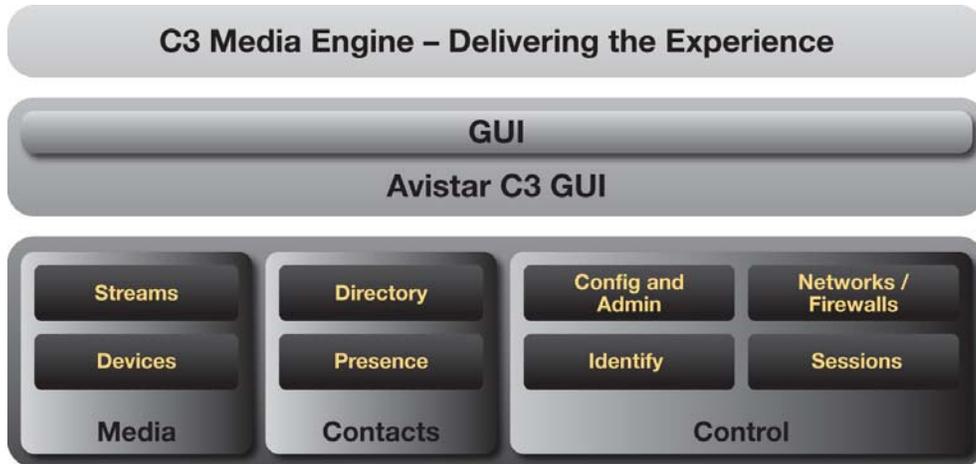
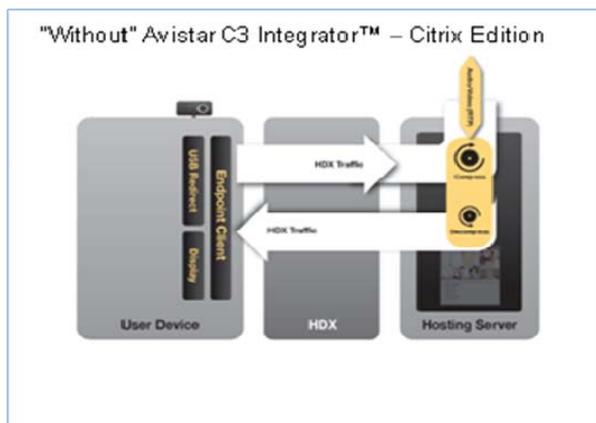


Figure 1. Avistar C3 Media Engine™

### Avistar C3 Integrator™ - Citrix Edition

Avistar has introduced a Citrix-enabled version of the Avistar C3 Media Engine™ solution that splits media engine functionality into two components, one running on the Citrix server and one running on the Citrix client.

The following figure depicts a typical desktop video deployment within a VDI environment. In these cases, although application control is moved to the server where it belongs, desktop video processing (compression/decompression) is also moved to the server which limits desktop videoconferencing performance, scalability and overburdens the network:



With Avistar C3 Integrator™ – Citrix Edition, application control remains on the server, thus preserving all the benefits of the VDI environment, while core video processing remains on the client which ensures application performance, server scalability and network performance. This is achieved by compartmentalizing the underlying Avistar C3 Media Engine™ within the Citrix client and server, and using the VDI to control all aspects of the solution, making the application control and processing transparent to the end user. This simplified, scalable and more efficient VDI enabled desktop videoconferencing deployment is depicted below:



Using this architecture, the Citrix-enabled Avistar C3 Media Engine™ solution plugs into application software running on the server using the exact same interfaces as those of the standard media engine, but all interface requests are relayed to the client-based media engine module using the Citrix HDX protocol.

The Avistar C3 Integrator™ - Citrix Edition solves the problems associated with video over VDI as follows:

- Avistar C3 Integrator™ - Citrix Edition transmits compressed video directly from the user terminal and avoids sending uncompressed video over the network. This makes the solution work in WAN environments and allows scaled deployments in LAN environments.
- Avistar C3 Integrator™ - Citrix Edition routes audio/video directly between clients over UDP and bypasses TCP-based VDI protocols entirely.
- Avistar C3 Integrator™ - Citrix Edition relegates audio/video compression and decompression to client, thereby significantly increasing the scalability of the solution.

Note that while XenApp and XenDesktop are two different Citrix products, the Citrix Virtual Channel SDK that allows communication across HDX is almost identical for these products, and as a result we expect no differences in the operation of the Avistar C3 Integrator™—Citrix Edition between XenApp and XenDesktop deployments.

## Enabling 3<sup>rd</sup> Party Media Solutions

By leveraging the Avistar C3 Integrator architecture, API's and related VDI plug-ins, the Avistar VDI solution can extend the value and reach of 3<sup>rd</sup> party voice and videoconferencing solutions by enabling these solutions to operate and properly scale within a VDI environment.

This VDI enabled UC architecture has been successfully leveraged to VDI enable the following Unified Communication solutions:

- Microsoft OCS
- Microsoft Lync
- IBM Sametime
- Avistar C3 Endpoints

## Operating System & Platform Support within the VDI

Although in most every instance the remote desktop (or VDA) utilizes a windows based platform such as Windows 7 or 8, the VDI is most often run on a variety of thin terminal specifications (Wyse & HP) and operating systems, such as Linux. In addition to the myriad of devices and operating systems needed to support VDI, initiatives such as SOC (System on a Chip) are embedded operating system and underlying system features such as video/audio encoding with embedded chipsets. This makes the task of developing and supporting a complete VDI enabled voice and videoconferencing solution a complex and costly undertaking.

**The Avistar C3 Integrator solution is designed and optimized to operate within this complex VDI environment by supporting the Windows, Linux, ThinOS, ThinPro operating systems, HP & Wyse terminal optimizations, SOC chipsets and webcam encoding/decoding features.**

## Conclusion

Without The Avistar C3 Integrator™ - Citrix Edition solution, businesses are limited in terms of deploying desktop videoconferencing within the VDI.

**With the Avistar C3 Integrator™ - Citrix Edition solution**, end users experience a feature rich videoconferencing solution within a VDI environment, while the application, server and network administrators inherit all the benefits afforded them by the virtual desktop infrastructure. These benefits extend to significant IT cost saving to the business itself.

For more information on these Avistar solutions, please visit our VDI portal at:

<http://www.avistar.com/solutions/virtualization/>

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