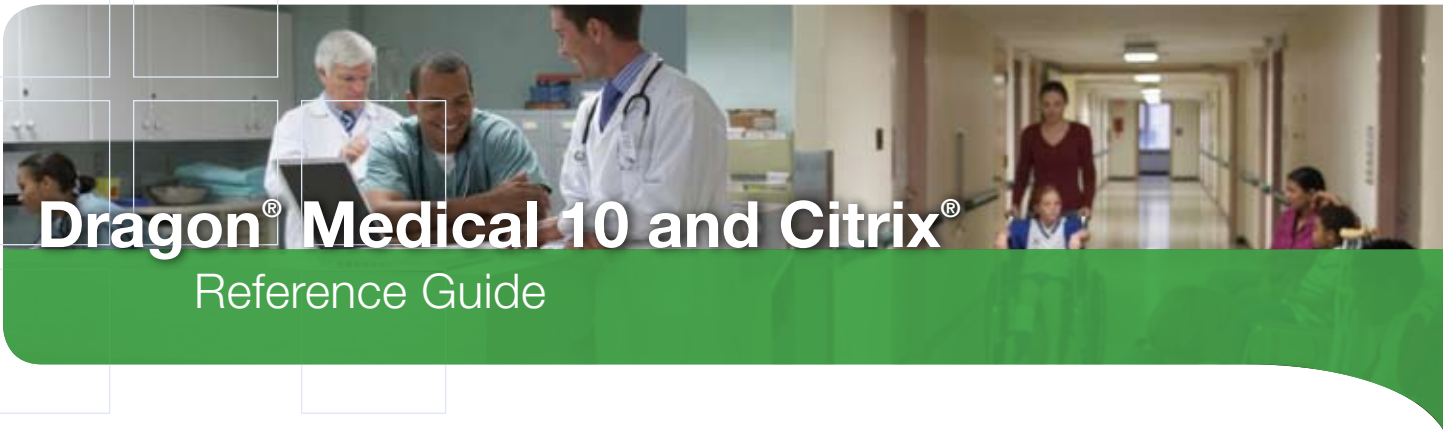


Dragon® Medical 10 and Citrix®

Reference Guide

Dragon® Medical 10 And Citrix

Introduction

As the number of deployed EMRs increases (estimated to increase 20% annually between 2003 and 2014 according to some industry analysts), hospitals and clinics are seeking solutions that simplify application delivery without sacrificing performance security or cost. Citrix Systems has been providing innovative software solutions that enable the best delivery methods for all applications. The Citrix ICA thin-client architecture provides a centralized, scalable and secure application delivery platform that can benefit organizations of all sizes.

The latest release of the award-winning Dragon Medical voice recognition software from Nuance Communications now supports deployments within a Citrix Presentation Server environment.

This reference guide shows how customers can benefit from using Dragon Medical 10 in a Citrix environment.

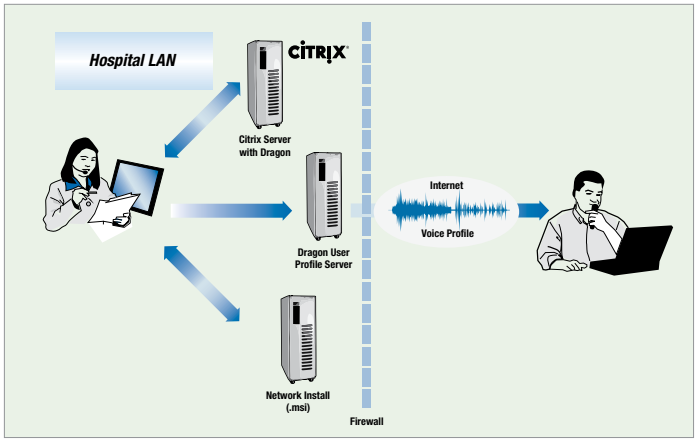
This guide supplements the Dragon IT Administrator's Guide in the supplied documentation. The IT Administrator's Guide explains how to install and configure Dragon on Citrix servers.

Citrix Overview

Citrix provides a server-based centralized architecture to deliver applications to end users. In Citrix, all application processing and logic occur on the server; the client PCs only display data and allow the user to interact with the graphical user interface of the program.

This approach is ideal for highly distributed environments where the administrative costs of maintaining a consistent PC desktop image are problematic or in scenarios where bandwidth and or client PC processing power is limited. Citrix also simplifies the process for updating software functionality by eliminating the need for end users to reboot the client PC.

Nuance Communications understands the value that Citrix brings to hospitals and large practices and it is for this reason that Dragon Medical 10 supports deployment in Citrix thin-client environments.



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Benefits of Running Dragon on a Citrix Server

Dragon Medical 10 supports installation on a Citrix Presentation Server, enabling users to dictate from workstations that do not have Dragon installed. Deploying Dragon Medical in a Citrix environment delivers the following features and benefits:

FEATURES	DESCRIPTION	BENEFITS
Standard Application Access	Access to Dragon Medical functionality via consistent and homogeneous methods	Simplifies end-user training for consistent end-user experience
Centralized Management & Administration	Deploy and manage all Dragon Medical users through Citrix management console	Reduced administrative overhead lowers total cost of ownership
Secure	Allows the administrator to control which end users have access to Dragon Medical	Ensures that only authorized users have access to Dragon Medical
Simplified Application Deployment	Eliminates the time and effort of installing Dragon Medical on client workstations	Lower administration costs; enables fast application deployment even for highly distributed or mobile organizations
Reduced PC Client-Side Hardware Requirements	Permits the use of client workstations that do not meet the system requirements for Dragon Medical	Enables deployment of complete Dragon Medical functionality on PCs that do not meet standard Dragon desktop requirements
Full Dragon Functionality	Users are able to utilize the same dictation functionality through Citrix that is available in the standard Dragon Medical desktop version.	Enables the application integration features of Dragon Medical, such as Select-and-Say™, Say-what-you-See™, and Natural Language commands, to be used with applications running on a server
Scalable and Reliable	Leverage proven Citrix support for automatic fail-over and load balancing	Deploy Dragon Medical in distributed high transaction volume environments with high availability security.

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Specifications and Deployment

Nuance provides support for deploying and running Dragon Medical 10 in a Citrix environment. Customers of Dragon Medical 10 must purchase a license for each speaker that creates a user profile in Citrix. Note that Citrix support is only available in the Dragon Medical and Dragon Medical Enterprise editions.

Deploying Dragon Medical 10 requires the following Citrix components:

Server

Citrix® Metaframe Presentation Server 4.0 or 4.5, Enterprise Edition or Advanced Edition on either:

- Microsoft® Windows® Server 2003
- Microsoft Windows® 2000 Advanced Server

Client

Citrix ICA client 8.x, 9.x, or 10.x on either:

- Microsoft® Windows® 2000 Service Pack 3, 4
- Microsoft Windows XP Service Pack 2, 3
- Microsoft Windows Vista or Microsoft Vista SP1

Sizing and Configuring Dragon Medical in Citrix Key Issues to Consider

Organizations considering deployments of Dragon in a Citrix environment need to consider several items for configuring the Citrix environment and scaling client usage on Citrix servers. This section provides some basic guidelines on how to address these issues to ensure maximum performance. Please note these are guidelines only and not definitive specifications; actual performance will vary from customer to customer.

Deploying Dragon Medical in a Citrix environment must consider the following 3 items:

1. Projected user base and usage metrics
2. Server-side hardware
3. Network bandwidth

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1. Projected User Base

Before considering any deployment of Dragon Medical in Citrix, organizations need to answer key questions about the user base and potential growth. These metrics are essential since they are needed to size the appropriate network and hardware requirements.

- How many users do you plan to enable access to Dragon through a Citrix environment in the first 6 months? 12 months?
- What is the projected distribution of simultaneous user access to Dragon in a Citrix environment?
- Where will these users be physically distributed? On the same corporate LAN, WAN, remote access or combination?

2. Server-Side Hardware

Dragon Medical Version 10 has been tested to run in a Citrix enterprise environment configured with Citrix Presentation Server 4.0 or 4.5, and clients running Citrix ICA thin-client software. Based on answers to question #1, your organization will need to scale and deploy an appropriate number of Windows servers to run Citrix Presentation Server 3.0, 4.0 or 4.5 to support all your Dragon users. In the appendix, we provide some baseline performance data using standard Windows hardware.

3. Network Bandwidth

The request for network bandwidth when running Dragon derives primarily from requests issued on the virtual audio channel. Nuance recommends and checks for use of the high-quality sound on Citrix to ensure the highest quality of accuracy for speech recognition.

Based on the user population you intend to serve, you must account for and allocate the appropriate amount of network bandwidth for users to be able to utilize Dragon Medical 10 from a Citrix client.

For information about setting sound quality on Citrix ICA clients, refer to the *Dragon IT Administrator's Guide* in the supplied documentation.

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APPENDIX
Preliminary Test Results of Running Dragon Medical 10 in Citrix

Listed below are the results of Nuance's internal testing of Dragon Medical 10 in a Citrix environment. This information stated is only meant to provide guidance for setting up your Citrix environment; it is not a definitive specification.

Your experience using Dragon with Citrix may vary, depending on many factors that may not be addressed in this brief overview. This appendix should help you accurately size what is required within your Citrix environment for Dragon.

The internal Nuance testing of Dragon with Citrix utilized the following components.

SERVER SPECIFICATIONS

Server Hardware

Dell PowerEdge™ 2850

Processor: Dual Intel® Xeon™ single-core processor, 3.16 GHz/1MB cache, 800 MHz FSB
Memory: 4GB DDR2 400 MHz (4x1GB), single ranked DIMMs
Hard Drive: 146GB 10K RPM Ultra 320 SCSI Hard Drive
Network Card: Dual Onboard NICs

Dell PowerEdge™ 6850

Processor: Quad Intel® Xeon™ single-core processor, 3.16 GHz/1MB cache, Redundant
Memory: 8GB DDR2 400 MHz (8x1GB), single ranked DIMMs
Hard Drive: 146GB 10K RPM Ultra 320 SCSI Hard Drive
Network Card: Dual Onboard NICs

Server Software

- Windows Server 2003
- Published applications:
  - Dragon Medical 10 and Medical Enterprise 10
  - Dragon Audio Client Update
  - Microsoft® Outlook
  - Microsoft® Word 2003

Client Software

- Citrix client user interfaces: ICA 32-bit clients, version 8.x and 9.x
- Program Neighborhood
- Program Neighborhood Agent
- Web Client

PC Client Specifications

- Dell Optiplex™ GX 260 with Windows XP
- 512 RAM and 2 GHz CPU
- Sound card: Sound Blaster Live! And also on-board sound systems

Network Specifications

Network speed: 100 Mbps Fast Ethernet
Network environment and active software run on the server:

- Latest Citrix Presentation Server 4.0 or 4.5 service packs were installed; available from www.citrix.com
- Citrix tools for CPU and memory management were activated to optimize server performance.
- An unspecific amount of corporate network traffic was present during testing that was not generated by the Citrix transactions created by running Dragon

NOTE: no additional high-memory or CPU-consuming applications were active during testing

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INITIAL RESULTS:
CPU Consumption and Memory Usage Running Dragon Medical

The following tables show the CPU time and memory usage observed on the Citrix servers with Dragon Version 10 running. The CPU time represents the total time (expressed as a percentage) used by a single client session; the percentage is a total of available CPU. Memory usage is also represented for a single-user session as a percentage of total RAM available.

Peak CPU consumption is reached when Dragon user profiles are being opened, saved and closed.

Acoustic training appears to consume the most amount of CPU time for any process executed with Dragon on Citrix. As such, administrative procedures that run any training process need to take this into consideration.

CPU consumption, with one user dictating and correcting in the DragonPad		
	Average	**Peak**
CPU time (Dual processor)	10%	25%
CPU time (Quad processor)	5%	13%

CPU consumption, performing General Training in New User Wizard, Additional Training or running the Acoustic Optimizer		
	Average	**Peak**
CPU time (Dual processor)	25%	30%
CPU time (Quad processor)	12%	18%

Memory consumption, with one user dictating and correcting in the DragonPad		
	Average	**Peak**
RAM required for both Dual and Quad processors	130 MB	160 MB

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When other applications are running concurrently with Dragon:
• Dragon consumes the same amount of CPU time as it does when it runs alone • Memory usage for Dragon 10 will increase

For example, memory usage for Dragon goes up when running together with Microsoft Word 2003.

	Average	Peak
RAM required for a single session, Dragon/Microsoft Word 2003	160 MB	190 MB

When Dragon Medical 10 is not being used
• CPU time consumed is 0. • The same amount of RAM is required • Network bandwidth is 1.3 Mbps bandwidth if the microphone is active; 0 Mbps if the microphone is turned off.

INITIAL RESULTS:
Network Bandwidth

The network bandwidth setting for a single Dragon Citrix client MUST be at least 1.3 Mbps.

For information about setting sound quality on Citrix ICA clients, refer to the *Dragon IT Administrator's Guide* in the supplied documentation.

NOTE: If the microphone is turned off for an active Dragon session running on Citrix, network bandwidth on a channel drops almost to 0.

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Summary

Based on the foregoing observations made while testing a single Dragon 10 session running on Citrix, it is reasonable to conclude that deployment of Dragon will scale linearly in a Citrix Presentation Server environment. CPU consumption emerges as the most important limiting factor, as collective CPU time per session will determine how many Dragon sessions can be active at the same time.

Using the hardware and software configurations detailed in the appendix, here is the approximate range of Dragon Medical 10 sessions that can be expected to run on the Citrix Presentation Server 4.0 or 4.5, utilizing the hardware and software configurations outlined in the appendix:

- **Maximum Load:** In a realistic scenario, where multiple sessions are performing different types of activities (opening, saving and closing users, dictating, and correcting dictation), it can be expected that 6 concurrent Dragon/Citrix sessions can be executed.

- **Minimum Load:** Expect to run 4 concurrent Dragon/Citrix sessions in the case when all Dragon sessions are running acoustic training.

Nuance Communications, Inc.
Nuance (Nasdaq: NUAN) is the leading provider of speech and imaging solutions for businesses and consumers around the world. Its technologies, applications and services make the user experience more compelling by transforming the way people interact with information and how they create, share and use documents. Every day, millions of users and thousands of businesses experience Nuance's proven applications and professional services. For more information, please visit www.nuance.com.

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