IBM Network Station and Windows 2000 Server

Marketing and Technical Perspectives of the Windows 2000 Server Impact on the IBM Network Station Family of Thin Clients

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Series 2800, 2200, 1000, 300, Windows-Based Terminal, and NSM Xpress

Executive Summary

Overview

The introduction of the Microsoft Windows 2000 Server family[1] will allow IBM Network Station customers to upgrade their *Application Server Farms* to Windows 2000 Server with MetaFrame™ 1.88 for Windows 2000 Servers with no impact to the Network Stations. In addition, customers will have the opportunity to include the new IBM Windows-Based Terminal (WBT) Standard 1.5 and IBM NSM Xpress Network Station in their strategic thin client deployments.

The IBM Windows-Based Terminal comes preconfigured for local (flash) boot and provides configurable server connectivity on the client via RDP 5.0 or ICA. The IBM NSM Xpress Network Station also comes preconfigured for flash boot with configurable ICA server connectivity on the client and can optionally be managed by the Network Station Manager (NSM[2]) V2R1 server-based management tool. Customers will continue to have the option of running Network Station Manager (NSM) for PC Servers to *boot*, *configure*, or *authenticate* their Network Stations, as long as they are maintained as NT Servers, running either Microsoft Windows NT 4.0 Server or Microsoft Windows NT 4.0 Server Terminal Server Edition. Support for NSM V2R1 on Windows 2000 Server is expected to coincide with customer plans to migrate from NT to Windows 2000 later this year and may take advantage of new, upgraded, and integrated features of Windows 2000 Server, such as Active Directory™, Web Services with IIS 5.0, and the Microsoft DHCP Networking Service.

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[1] General Availability scheduled for February 17, 2000.

[2] The acronym, NSM, refers to the complete Network Station Manager product and should be distinguished from the like-named, Web-based Administration Tool.

The IBM Network Station product line includes these thin clients with server-based client management capability:

- Series 2200 and Series 2800 (x86 processor), running NSM V2R1

- Series 1000 (PowerPC processor), running NSM V2R1 or V1R3

- Series 300 (PowerPC processor), running NSM V2R1 or V1R3

…and has been enhanced with these new thin clients with client-based management capability:

- Series 2200 Windows-Based Terminal (WBT Standard 1.5 on flash, local boot)

- Series 2200 or Series 2800 NSM Xpress (NSM Client Code on flash, local boot)

Windows 2000 Server versus Windows NT Server 4.0

Windows 2000 Server is the follow-on operating system to Windows NT Server[3] with a complete set of infrastructure services based on the Active Directory™ directory service. Integration of Active Directory with the underlying security infrastructure provides a focal point for security management of users, groups, computers, devices, and network resources, making Windows 2000 easier to manage.

Windows 2000 Server enhances the capability of Windows NT Server 4.0 to support "enterprise-wise" computing applications and extends the application services established by Windows NT Server 4.0 by integrating such services as COM+ (based on extensions of the Component Object Model), transaction and message queuing, and XML support. Terminal Services is a configurable feature integrated into the Windows 2000 Server kernel; there is no special Terminal Server Edition of Windows 2000 Server, as there was with Windows NT Server 4.0 TSE. Additionally, there is no longer a need for separate Terminal Services Service Packs. Terminal Services in Windows 2000 Server are purported to be up to 20 percent more scalable and have improved performance for both high and low-bandwidth connections. The Microsoft Windows 2000 Server family consists of three server versions aimed at three distinct business environments:

- **Windows 2000 Server Standard Edition (**also known as **Windows 2000 Server)** is an operating system for small to medium sized enterprise application deployments, Web servers, workgroups, and most branch offices. See http://www.microsoft.com/technet/win2000/win2ksrv/manuals/srvgs/sgsch02.asp for detailed descriptions of key features, which include:

  - Active Directory

  - Windows Management Tools

  - Kerberos and Public Key Infrastructure (PKI) Security

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[3] Windows 2000 Professional, the follow-on product to Windows NT 4.0 Workstation, will not be discussed in this paper but is mentioned here for positioning purposes and completeness.

- Terminal Services

- COM+ component services

- Enhanced Internet and Web Services

- Up to 2-way SMP support (existing users will get 4-way SMP)

- **Windows 2000 Server Advanced Server** is a more powerful mid-range server that includes the full feature set of Windows 2000 Server and adds the advanced high-availability and improved scalability required for enterprise and larger departmental solutions. See http://www.microsoft.com/technet/win2000/win2ksrv/manuals/asgs/agsch02.asp for detailed descriptions of key features, which include:

  - All Windows 2000 Server features

  - Network Load Balancing that includes Terminal Services

  - Enhanced Application failover clustering

  - Component Load Balancing

  - High-performance sort

  - Up to 64Gb main memory

  - Up to 4-way SMP (existing users will get 8-way SMP)

- **Windows 2000 Datacenter Server**[4] is a specialized high-end version of Windows 2000 Server optimal for large data warehouses, econometric analysis, large-scale simulations in science and engineering, online transaction processing, server consolidation projects, and for large-scale Internet Service Providers (ISPs) and Web site hosting. Like Windows 2000 Advanced Server, it provides both clustering and load balancing services as standard features:

  - All Windows 2000 Advanced Server features

  - Up to 16-way SMP (32-way through OEMs)

  - More Advanced Clustering

  See http://www.microsoft.com/WINDOWS2000/library/howitworks/cluster/introcluster.asp for additional information on the Windows 2000 Server clustering technologies.

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[4] Windows 2000 Datacenter Server has an estimated general availability of three to six months after Windows 2000 Advanced Server releases to market.

NSM Server versus Application Server

The introduction of Windows 2000 Server makes it important to understand the distinction between an *NSM Server* and an *Application Server*. An NSM Server is the server where the NSM product is installed for booting, configuring, or authenticating the IBM Network Station. An Application Server is the server to which the Network Station's ICA client or WBT RDP client[5] connects in order to run server-based applications (for example, Lotus Notes, Office 97, and Internet Explorer). IBM Support has always recommended that the NSM Server be a separate server from the Application Server, primarily based on performance considerations. However, this recommendation becomes a requirement with Windows 2000 Server because, while the Application Server can be a Windows 2000 Server, the NSM Server must remain a Windows NT Server 4.0 or Windows NT Server 4.0 Terminal Server Edition.

In the past, some IBM Network Station customers have made their NSM Server and Application Server the same server. This single-server approach, while not advocated by IBM Support, was often used by customers during pilot or proof-of-concept trials where only one server was available. In those instances, the single server was running Windows NT Server 4.0 Terminal Server Edition with Citrix's MetaFrame for Windows NT Server 4.0 Terminal Server Edition. Once NSM is supported on Windows 2000 Server (expected later this year), an Application Server that is also used as an NSM server may be upgraded to Windows 2000 Server. However, the single-server installation is not recommended.
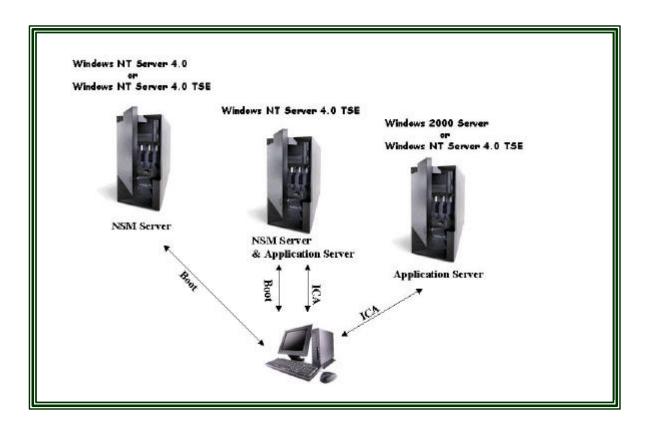

Figure: Present support for NSM and Application Server configurations.

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[5] WBT RDP 5.0 support is provided by the new Series 2200 WBT 1.5 thin client

ICA Client and Network Station Manager Implications

When the Terminal Services feature is configured on Windows 2000 Server, all client application execution, data processing, and data storage occurs on the server. This configuration is commonly used by thin clients that operate as Windows-Based Terminals (WBTs).

The MetaFrame product by Citrix, installed on Windows 2000 Server, allows ICA connections to be made to that server. Both the IBM Network Station V1R3 and V2R1 ICA Clients can establish connections to a server or server farm, consisting of one or more Windows 2000/MetaFrame Servers, Windows NT 4.0 TSE/MetaFrame Servers, or WinFrame™ Servers (Citrix's integrated application server on NT 3.51).   Citrix produces two versions of MetaFrame 1.8: one for Windows NT 4.0 TSE and one just announced for Windows 2000 Server. The Citrix product Web site, http://www.citrix.com/products/metaframe/ provides details on function and availability.

The following table summarizes the server support for the Network Station Manager (NSM) product for specific Network Stations models.

NSM Version	Supported on Windows NT Server 4.0	Supported on Windows NT Server 4.0 Terminal Server Edition	ICA Client can connect to Citrix Device Servicesä	ICA Client can connect to Citrix WinFrameä Server	ICA Client can connect to Citrix Metaframeä 1.8 for Windows NT 4.0 TSE	ICA Client can connect to Citrix MetaFrameä 1.8 for Windows 2000 Server
V1R3 For Network Station Series 1000 and 300	Yes SP3 (or later)	Yes SP3 (or later)	Yes	Yes	Yes	Yes
V2R1 For Network Station Series 2800, 2200, and 1000	Yes SP4 (or later)	Yes SP4 (or later)	Yes	Yes	Yes	Yes

Table 1. Present Server Support for NSM and Application Server Farm Access.

ICA versus RDP Client-Server Connectivity
Terminal Services on Windows NT 4.0 TSE and Windows 2000 Server support both the Remote Desktop Protocol (RDP), a proprietary Microsoft connection protocol, and Independent Computing Architecture (ICA), the server connection protocol from Citrix. Both the RDP and ICA Clients are available on the IBM Windows-Based Terminal (WBT Standard 1.5), and either can be used to connect to Windows NT 4.0 Terminal Server Edition or Windows 2000 Server.

RDP
With RDP 5.0 on the Series 2200 WBT, no additional OEM server product is required. RDP Clients can establish a desktop connection to the server and optionally start a designated application following login. In additional, a WBT-attached printer will become the default printer, and any print jobs will be redirected to the local printer for that client. Administratively on the server side, remote control of one RDP session by another is possible. Network Load Balancing of RDP connections is available in Windows 2000 Advanced Server and Datacenter Server.

ICA

With ICA, the target server must be running either Citrix MetaFrame or Citrix Device Services™. MetaFrame provides centralized management tools, such as application configuration and deployment, auto client update, shadowing, and remote debug, as well as additional management products such as Installation Management Services and Resource Management Services for single-point management and control for Terminal Server Environments. Citrix Device Services (CDS) provides basic ICA connectivity similar in function to that available with RDP. ICA Clients connecting to a CDS server can establish a desktop and optionally launch a startup application. Printer redirection and virtual COM port mapping is provided. ICA connections to CDS are not load balanced and cannot be shadowed. CDS can be upgraded to MetaFrame when enterprise management is required, but CDS servers cannot participate in an Application Server Farm. Citrix Device Services for Windows NT 4.0 Terminal Server Edition is available now from IBM Network Station Business Partners. Citrix plans to have support for CDS on Windows 2000 Server in May.

RDP or ICA?

Both RDP and ICA are presentation services protocols used to transport keystrokes, mouse clicks, and screen updates between the client and server. ICA has been around longer than RDP, and there is industry evidence that suggests ICA currently runs thinner (takes less bandwidth) than RDP. The decision to use one protocol over the other can be subjective, however, both Microsoft (see http://www.microsoft.com/NTServer/terminalserver/exec/moreinfo/FAQ.asp#features) and Citrix (click the **Feature Comparison DOC** hyperlink at http://www.citrix.com/products/win2000.asp) provide useful functional comparisons of RDP and ICA.

A customer's decision to go with one protocol over the other is also a decision about server-side capabilities. Some server features to consider are:

- Published Application Management. (MetaFrame)

- Load Balancing (MetaFrame)

- Network Balancing (Windows 2000 Advanced Server Terminal Services: via DNS Round Robin, limited to 32 servers)

- Shadowing/Remote Control (MetaFrame: one-to-one, one-to-many, many-to-one, Windows 2000 Server Terminal Services: one-to one)

- Installation Management Services (MetaFrame: install once, propagate to other servers)

The following table summarizes the client-server connectivity options available for local boot thin clients.

Local Boot Clients	RDP Client can connect to Windows NT 4.0 TSE	RDP Client can connect to Windows 2000 Server	ICA Client can connect to Citrix Device Servicesä	ICA Client can connect to Citrix WinFrameä Server	ICA Client can connect to Citrix Metaframeä 1.8 for Windows NT 4.0 TSE	ICA Client can connect to Citrix MetaFrameä 1.8 for Windows 2000 Server
Windows-Based Terminal WBT Standard 1.5 **16Mb Flash Card with client-initiated update capability via HTTP or FTP**	Yes	Yes	Yes	Yes	Yes	Yes
NSM Xpress 48Mb Flash Card with updates via FlashWare[6]	N/A	N/A	Yes	Yes	Yes	Yes

Table 2. Server Connectivity Options for Local Boot Thin Clients

Support Impact

Pending support for Network Station Manager (NSM) V2R1 on Windows 2000 Server, customers who want PC server-based management of their Network Stations should plan to maintain a Windows NT 4.0 Server or Windows NT 4.0 Terminal Server Edition for this purpose.   Customers will continue to have the option to boot and administer Network Stations from AIX or AS400 servers and to optionally create and manage flash card images from those servers[7].   Some alternative boot and administration methods include:

- Flash boot; use AIX and/or AS400 Server for configuration and user authentication. For V2R1 and V1R3.

- Flash boot, kiosk mode; use AIX or AS400 for configuration, bypass user authentication. For V2R1 only.

- QuickOn for Windows--flash solution for Windows-Based Terminal function. V1R3 only.

- Server boot and administration from AIX or AS400 NSM Server. For V2R1 and V1R3.

Where customers do not require server boot and administration, the IBM Windows-Based Terminal and NSM Xpress thin clients provide ready connectivity to Windows 2000 Server via RDP and/or ICA.

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[6] FlashWare is a flash card update tool for Windows NT 4.0 Server that gets its flash image from CD or a designated Web site. NSM Xpress can get an updated flash image from any PC on the network running the FlashWare tool.

[7] It should be noted that it is far more economical to maintain an NSM Server on Windows NT 4.0 than it is to resort to use of an AIX or AS400 server for boot and administration--unless the customer already has AIX or AS400 servers available.

IBM Support personnel will inform customers that Network Station Manager (NSM) V2R1 running on Windows 2000 Server is currently an unsupported configuration, but they need to also be aware of the symptoms of a customer attempting to set up this configuration today:

- Attempting to Install Network Station Manager (NSM) on Windows 2000 Server

  Installation will fail because the install program will not detect a valid Windows NT Service Pack and will fail to confirm Internet Information Server 5.0 as a valid Web Server[8].   Error messages to be expected:

  V2R1 Installation Error Message:

  Setup failed because the following products are not installed.
  You must install the following prerequisites:

  *Microsoft Windows NT Service Pack 4
  *Web Server (choose one)
  　　　-Lotus Domino Go Webserver 4.6.2.2 or higher
  　　　-Microsoft Internet Information Server 4.x

  V1R3 Installation Error Message:

  Setup has failed because the following products are not
  Installed:

  *Microsoft Windows NT Service Pack 3
  *Lotus Domino Go Webserver or Microsoft Internet
    Information Server 4.0

- Attempting to upgrade a Windows NT 4.0 Server--with Network Station Manager already installed on it—to Windows 2000 Server

  The IBM DHCP service will not function because the WEJ (protocol interface into the LAN stack) will get removed in the upgrade. However, the Network Station Manager *may* be unaffected and continue to function. Regardless, since this configuration is not supported, customer expectation of NSM functionality should be set appropriately.
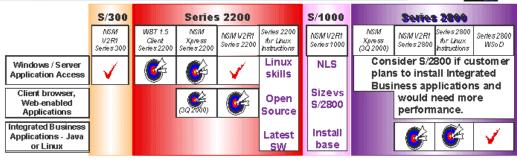
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[8] The Lotus Domino Go Web Server cannot be used, as there is no support for it on Windows 2000 Server.

Market Positioning

With the introduction of the Series 2200 WBT Standard 1.5 and the NSM Xpress "up in a flash" offerings for the Series 2200 and Series 2800, you have the ability to meet customer expectations and sell them what they want and need -- with the additional flexibility to extend the useful life of their thin client by being able to change the operating environment to meet their future needs (i.e., change from WBT or NSM Xpress to NSM V2R1 or Linux).

IBM Network Station Family Solutions
Choose the best solution fit

For example, departments or small businesses may want thin clients that are easy to install and quick to start and provide access to Windows 2000 Server applications and the Web via a browser. For those customers that want Microsoft WBT Standard 1.5 thin client software, the Series 2200 WBT is the best option. If they want the function of a WBT, but do not require, or would prefer IBM NSM V2R1 thin client software and Citrix ICA capabilities, then the flash-based NSM Xpress on the Series 2200 is the best fit. Neither of these thin client solutions requires an NSM V2R1 server for installation or use.

NSM V2R1 on the Series 2200 or Series 2800

For customers who want access to Windows 2000 Server applications, the benefits of a client-side browser, and full server-management functions, NSM V2R1 on the Series 2200 with Citrix MetaFrame 1.8 for Windows 2000 Servers, or Citrix Device Services is a perfect fit. Customers that recognize the benefits of a full server-managed environment usually have Windows NT 4.0 TSE (or AS/400, AIX) systems to host NSM V2R1 since they are likely to be current users of this environment prior to their migration to Windows 2000 Server. Until NSM V2R1 is supported on Windows 2000 Server later this year, another NSM V2R1 capable system can boot the Network Stations, and/or be used to create flash cards for the deployed Network Stations so they can boot themselves and access local Windows 2000 Server applications.

Additional Information

Microsoft TechNet – Windows 2000

http://www.microsoft.com/technet/win2000/default.asp

Thin Planet: Windows 2000 Community Board

http://www.thinplanet.com/Community/Boards/main.asp?type=s&board=Windows+2000+Server

Citrix and Windows 2000 Positioning Points

http://www.citrix.com/products/win2000.asp

IBM for Windows 2000

http://www-1.ibm.com/windows2000/

Sales Compass – Solutions: Selling Windows 2000 Solutions

http://w3-3.ibm.com/sales/compass/learning/05101aaa/content.html

Citrix MetaFrameä 1.8 for Windows 2000 Servers

http://www.citrix.com/products/metaframe/

Windows 2000 Terminal Services Reviewers Guide

http://www.microsoft.com/TechNet/win2000/win2kts/prodfact/w2ktsrg.asp

Network Station – Citrix Device Services Support

http://www.pc.ibm.com/us/support/networkstation/cdsreg.html?lang=en_US&page=brand&brand=root&doctype=&subtype=All

Terminal Server Product FAQ

http://www.microsoft.com/NTServer/terminalserver/exec/moreinfo/FAQ.asp